February 1942

TECHNOLOGY REVIEW



technology review

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NORTON ABRASIVES



NIGHT LIFE . . . at a grinding wheel plant

The new Plant 1 (left) replaced the original building at the Norton plant in 1939.

The new Plant 3 (right) replaced the former building in 1938.

New Abrasive Storage buildings in 1941.

Total additional floor space, 7.6 acres, completed this year.

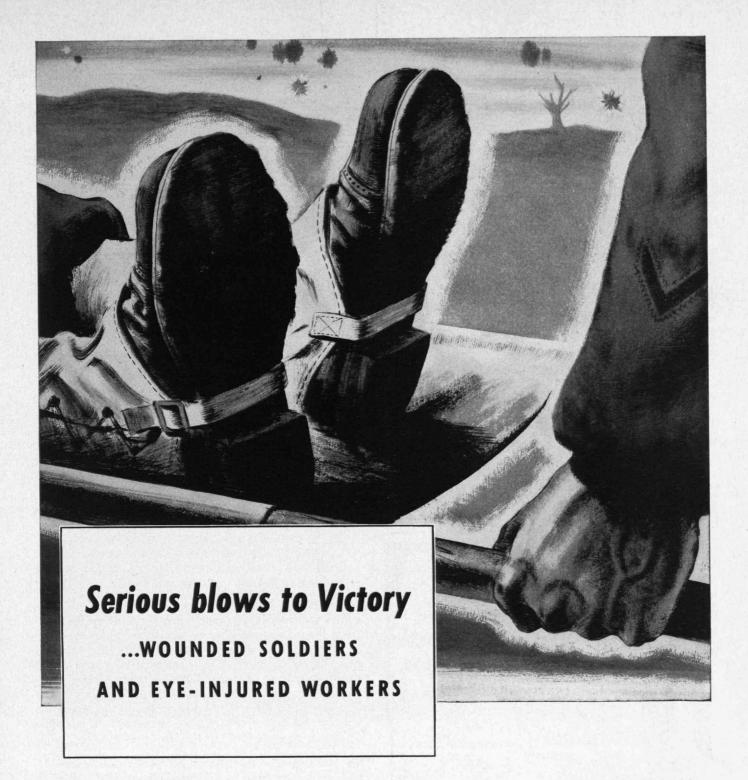
New tunnel kilns, new facilities, larger payroll, day and night operation, have stepped up production.

NORTON COMPANY, Worcester, Mass.

BEHR-MANNING DIVISION, TROY, N. Y .- Abrasive Paper and Cloth

WHEN IT'S AN ABRASIVE PROBLEM, CALL IN NORTON ENGINEERING





INDUSTRIAL eye-casualties that take workers—even temporarily—from the battle for the production of war materials, can hurt the cause of Victory as much—or even more—than the loss of a soldier or sailor. In 1940 and 1941, nearly 20,000,000 man-hours needed to turn out munitions, ships, tanks and planes were lost by industrial eye accidents alone.

Those lost man-hours were lost forever. A most terrible tragedy and waste. But the point right now is this: eye accidents must not happen from now on.

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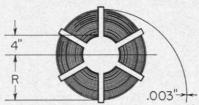
No. 40

Just for Fun!

A CHALLENGE

TO YOUR INGENUITY

A REEL capable of holding 4,000 feet of steel tape .003 inch thick is to be designed. If the inner (hub) radius is 4 inches, can you derive, in your head, a formula and rough numerical value for R?



Answer: An ingenious approach to problems of this type was worked out several years ago in a neighboring company. The designer merely equated the area of the thin edge of the tape [144 square inches] to $\pi(R^2-4^2)$ and solved for R. In this case, R = about 8 inches.

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THE TABULAR VIEW

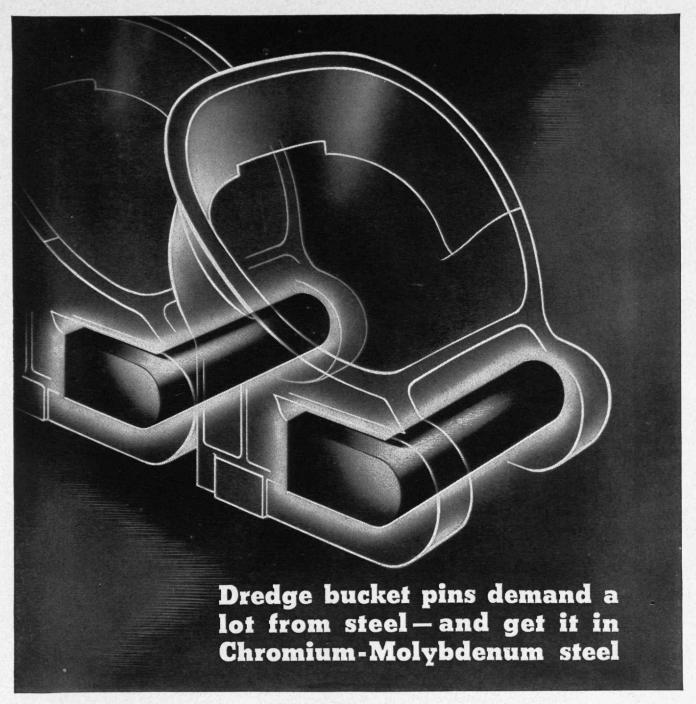
Whodunit. — From the historical point of view, a salient difference between invention and discovery is that the first is so often evolutional whilst the second is usually initiatory. The distinction is implicit in W. Mack Angas' discussion (page 169) of the precursors of Robert Fulton in the development of steam navigation. Captain Angas, a graduate of the Institute in the Class of 1917, is public works officer of the United States Navy Yard at Charleston, S. C., and of the Sixth Naval District. His studies in the history of ocean-going steamers have resulted in a book, Rivalry on the Atlantic, as well as in magazine articles, including a description of early marine power plants published in The Review for March, 1940.

Employable. — That woman's work is never done is a cliché of long standing. But the question of what woman's work is, or should be, remains open to debate, particularly as technological developments both rob woman of her usual tasks and create demand for more workers possessing her special abilities. A pioneering analysis of opportunities for women in industrial employment and of what full utilization of those opportunities might be expected to mean to the work force as a whole and to the industrial community is made for The Review (page 172) by Herbert S. Swan, whose discussion of work apportionment appeared in our November issue. Mr. Swan has been engaged in industrial development, city planning, and zoning work for the past thirty-one years.

Machine Makers. — Extraordinary demands for machines and machine products are a commonplace in these days of war urgency. As a result, machine tools as such are in prominence. The origins of these machines whose function is to build other machines have engaged Leroy L. Thwing, '03, historian of applied technology, who describes them in this issue of The Review (page 175). Mr. Thwing is a frequent contributor; his most recent paper — on early methods of drilling — appeared in The Review for November.

Apt Adapters.— Interesting perspective on science and technology is to be had from observing the ways in which more or less primitive peoples accommodate themselves to the technologizing of their world. In our own country, the versatile Navahos afford instructive illustration of the process. Clyde Kluckhohn, assistant professor of anthropology at Harvard, who has studied these Indians at first hand for years, writes (page 178) with understanding and appreciation of their adjustment.

Policy.— How educational institutions can best do their duty in time of war is a perplexing problem, toward the solution of which the Faculty and Corporation of the Institute contribute in a statement of policy published in full in the Institute Gazette (page 181).



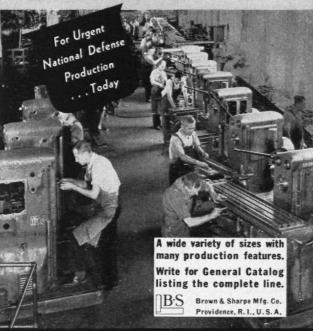
Dredge bucket pins are heavy (4-8 inches diameter), must withstand heavy static and impact loads, and must have extra good wear resistance. It is a tough assignment for any steel.

A medium carbon Chromium-Molybdenum steel developing uniform hardness in heavy sections is being used for this application. Here is a permanent place for one of the most versatile of alloy steels—a steel that, with minor variations in carbon and manganese content, is meeting requirements in parts ranging from $0.065^{\prime\prime}$ wall aircraft tubing to $12^{\prime\prime}$ shafting. Our free booklet "Molybdenum in Steel" will gladly be sent on request to interested students, graduates or teaching staffs.

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MAIL RETURNS

Palms

FROM PAUL F. JOHNSON, '98:

The title "date palms" is evidently in error for the very excellent picture by Chester H. Pope, '09 [December Review, page 68]. Date palms look quite different, and the blossoms are up among the leaves or, rather, the fronds. The palms pictured are most certainly what the nurserymen call Seaforthia elegans, a rather rare palm in these parts.

On my place I have one that is about twenty-six years old, twenty-four since being planted. The fronds are similar to those of commercial date palms, the *Phoenix canariensis* (Canary Island date) and the *Cocos plumosa*. The flowering habit and fruit, however, are entirely different from any of them. The individual flowers are small and pale yellow and, like other palm flowers, much appreciated by honeybees. But they come out year after year at the same place in the bole, just at the long sheath of the fronds, and eventually surround the trunk at this place with fresh blossoms, immature fruit, ripe fruit, and dead stalks (which we remove).

The mature fruit is bright red, just about the color and size of a cranberry but is elongated to olive shape. The pulp is very thin, therefore inedible. My tree did not mature any fruit until a couple of years ago and surprised me with its color. No doubt some of the naturalists near you can give you more accurate and complete data. I am not a botanist.

Altadena, Calif.

Percentage

FROM ALFRED L. FITCH, '84:

The article, "Rolling Off a Log," by Thomas D. Perry in the December issue of The Review interested me, and the comparative table on page 88 raised the same question about which I wrote you in June, 1937 (see my letter published in the July, 1937, Review, and the replies which appeared in November, 1937).

To take one example: Multi-ply birch plywood, .142 inch thick, is stated in the article to be 200 per cent thicker than aluminum, .0712 inch. The birch is twice as thick as the aluminum, but it is only 100 per cent thicker.

A hasty mental inspection of the other figures for steel and aluminum indicates that each of them is 100 too high.

North Easton, Mass.

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Ossana Cornán

To form glass "staple fiber," molten glass pouring from orifices through a high-pressure steam jet is driven in separate fibers onto a rapidly revolving drum from which the fibers are gathered into a roving and wound on a spindle or spool.

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

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THEORY OF FLIGHT

. . . appears to be under discussion in this example of photography by the Edgerton technique as practiced by Frank S. Wyle, '41.

THE

TECHNOLOGY

REVIEW

Vol. 44, No. 4



February, 1942

The Trend of Affairs

New England's Foundation

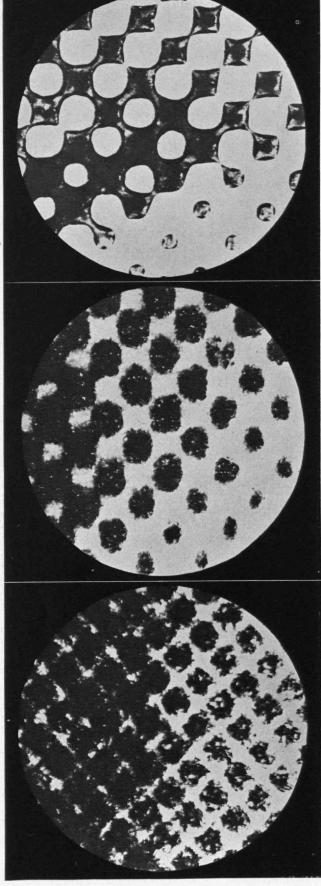
TEW ENGLAND mothered the industrial revolution in America. In this region grew up the legends of Yankee ingenuity and Yankee craftsmanship. New Englanders built and sailed the clippers when these ships were the superlative in marine transportation; New Englanders supplied the nation with oil, built its machine tools, wove its textiles, and supplied men and money to aid in the expansion of the frontiers. One hundred years ago, half the industrial production of the country came from the six states forming the northeastern corner of the United States.

Unfortunately, the only road away from the top leads downward. As the frontiers swept westward, uncovering on the way tremendous natural resources, the relative position of these six states in the nation's economy inevitably worsened. Had New England industry continued to grow, however slowly in comparison with the rest of the country, or had it even maintained something approximating a status quo, its declining relative position would have been no more than a little-known mathematical inevitability. But during the 1920's and particularly during the years immediately following the first World War, a veritable epidemic struck New England plants. The textile industry began to move south, closer to raw materials and cheap labor; shoe factories migrated westward, toward their markets; paper manufacturers were attracted by virgin stands of timber in other parts of the country; and New England's once near-monopoly on the manufacture of tools and machine tools was lost for good. New Englanders became familiar with the sight of factory buildings empty or in the course of demolition.

Yet no inherent reason existed for this decline. While wood has ceased to be the dominant structural material, the considerable timber resources still remaining in New England have a multitude of important applications. True, New England lacks the coal and iron necessary to support heavy industry (although Massachusetts mined the first iron ore in America, and the Salisbury iron mines in Connecticut have just been reopened), and New England's ocean-going oil wells - the whales could not compete with wells in Oklahoma and Texas. But the New England area can nevertheless claim an imposing list of mineral resources — many more, in fact, than have been suspected — and it also possesses excellent rail and water transportation facilities as well as plentiful supplies of good water. Its capital is adequate, its educational and research facilities are unsurpassed, and its population is skilled, vigorous, and enterprising. By intelligent exploitation, nations have done wonders with less - Switzerland is an outstanding example.

As the depression lifted, these advantages began to tell; in comparison with the rest of the country, New England presents a better picture today than it did in 1929. Instead of losing industries, it is now gaining them, partly by immigration from other areas. Notable among the agencies which have organized New Englanders into a common attack on their regional problems is the New England Council. Established in 1925, it is one of the oldest attempts at regional planning in the United States. With the characteristic Yankee faith in oneself and the Lord, the council has encouraged New England industrialists to solve their difficulties by research, for, while alert to point out the advantages of New England sites to outside manufacturers, it has realized that one area must lose when another gains an industry by migration.

In the fall of 1939 the council set up a new-products committee under the chairmanship of President Compton. The purpose of the committee was, broadly, to study the industrial possibilities of New England and to



Top: letterpress half tone (x57); middle, offset lithography half tone (x57); bottom, rotary photogravure print (x57)

investigate new products and processes which were particularly adaptable to the resources and needs of New England. As the investigations progressed, it became apparent that the greatest need was not resources or capital or ideas but a means for bringing together industrial opportunities, capital, and raw-material sources.

For example, because of new uses which have been created, new recovery methods which make profitable the working of lower grade ores, and the gradual exhaustion of rich deposits elsewhere, the minerals of New England have been found to be a far more important asset than had been realized even a generation ago. Studies to determine the suitability of New England sands for glassmaking have revealed interesting possibilities. A unique deposit is now being operated experimentally in Connecticut. The occurrence in New England of the major constituents of glass, with the exception of soda ash, is believed to justify consideration of locating a glass plant in this area for the purpose of serving near-by markets. Indeed within the past few months a branch plant for manufacturing Fiberglas has been started in Rhode Island. Although the location of this plant in New England was determined by factors other than the availability of raw materials, the possibility of utilizing such materials was an added advantage. Now that it is practical to obtain alpha-cellulose pulp from hardwoods, of which New England has ample amounts, this area becomes a logical site for manufacturing rayon staple, since staple is used in great quantities by New England textile mills. Thus are raw material and market placed close together, the same combination of circumstances that helped induce some New England textile firms to move south.

In view of such conditions, the new-products committee recommended the formation of an agency which could analyze from every point of view — engineering, economic, and social — the possibilities of new processes and products in relation to New England's situation, and which could furnish impartial, authoritative information to venture capital.

The result is the New England Industrial Research Foundation, for which funds of about \$100,000 are now being raised. This amount, it has been estimated, will see the foundation through its first two years, in which time it should establish itself on a self-maintaining basis. Quasi-public in character and under the sponsor-

These photomicrographs by F. W. Clulow, reproduced by courtesy of the Printing and Allied Trades Research Association of London, England, illustrate the three most generally used devices whereby the graphic arts bring picture and word to millions. Letterpress - the oldest form of printing - conveys ink to paper by means of surfaces that stand out in relief. All printing surfaces are on one plane; all nonprinting surfaces are below it. Offset lithography, on the contrary, is planographic, both printing and nonprinting surfaces being in the same plane. Grease which attracts ink, and water which repels it, are used to assure distribution of the ink in the proper areas, from which it is transferred to a rubber blanket that in turn transfers or "offsets" it to the paper. Photogravure completes the cycle by carrying its ink in pockets, or wells, below the surface of the plate, from which it is pulled out by the paper. For the presentation of pictures, letterpress and offset lithography rely on a pattern of uniformly black dots which differ in size to impart variation in tone to the whole. Photogravure, on the other hand, utilizes wells of standard size, securing variations in tone by differences in the depth of the wells and hence differences in the amount of ink which they carry . . . ship of the New England Council, the foundation will not undertake research in the usual industrial sense; that is, it will not attempt to create and develop. On the contrary, it will co-ordinate research with other pertinent information, consulting with private and institutional research facilities, bankers, lawyers, and economists in order to appraise industrial opportunities. It is also hoped that an important function may be to assist smaller industries which have no research facilities of their own to organize and carry out research programs.

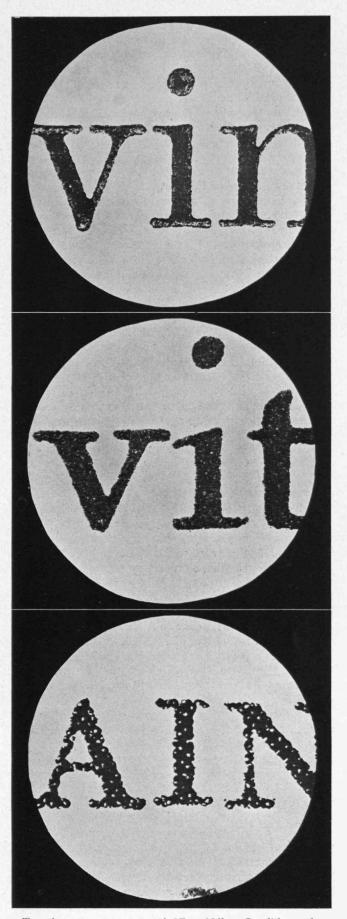
Although the foundation is as yet without a parallel, industry is showing signs of becoming conscious of a need for similar co-ordinating agencies. A service now available to banks, for example, will advise the clients of a bank on their research requirements. The service will send the client's problem to appropriate consultants, organize the replies, and report on the possibilities of research as applied to the client's problem.

"C"-ing to See

THE more light, the better, at least to a point where $oldsymbol{1}$ indoor illumination equals the levels of outdoor light. This statement summarizes conclusions reached by investigators working under the direction of Parry Moon, '27, Associate Professor of Electrical Engineering at Technology, in a study of visual acuity in its relation to illumination. Tests for visual acuity are designed to determine the smallest objects which the observer can see under given conditions; sharpness of vision is measured by such studies. In the investigation made at Technology, a standard letter "C" was used as the test object. Various sizes of the letter were employed, and the test object was rotated from test to test so that the position of the opening of the "C" was shifted. Errors in accurate seeing of the letter were correlated with the amount of illumination to give a measurement of acuity. The tests admittedly differ from average conditions of seeing, in that the entire field of view was made of uniform brightness through the use of a plain white background against which the black test object was displayed.

The goodness of seeing was found to grow steadily as the amount of illumination increased, and was still climbing when 10,000 lumens per square meter had been

The "squash mark" which denotes letterpress printing - a dark line at the edge of the characters - results from the fact that the pressure applied during printing tends to force ink toward the edges of the raised printing surfaces. The degree of smoothness of the paper and the facility with which it absorbs ink affect the intensity of squash marks and hence the crispness of appearance characteristic of the letterpress page. With offset lithography, the tendency of portions of the plane surface to accept or repel ink determines the boundary of printed and unprinted areas, and as a consequence the sharp-edge effect does not appear. The result is a softness of the mass impression of the page as a whole. Each kind of effect, of course, has individual aesthetic values. In gravure, since the plane surface does not print at all - the ink being removed from it by a blade - type matter must be presented, just as pictorial matter is, by means of ink carried in tiny wells below the surface. Hence the images of characters are made up of series of dots representing wells of uniform depth in the printing plate. The transfer of ink in this process is direct from the plate to the paper, as in letterpress printing, but the squash-mark effect is precluded by the fact that the plate is intaglio rather than cameo.



Top: letterpress type matter (x15); middle, offset lithography type matter (x15); bottom, rotary photogravure print (x15)

reached. This level of illumination is about equal to outdoor conditions on an overcast day. Customary levels of indoor illumination are only about 1/100 to 1/10 this value.

To the question which immediately arises, "Why not more light indoors?" an economic answer must be given. At present efficiencies of incandescent and fluorescent electric lamps, an optimum point of illumination is reached at about 250 lumens per square meter for incandescent lighting and at about 500 lumens per square meter for fluorescent. To go from the 500lumen level to one of 1,000 lumens would almost double costs for both current and installation but would produce only about 10 per cent increase in acuity. The efficiency of electrical lighting equipment has been constantly improved in years past and is of course under continual study looking to further improvement. Recommended levels of interior illumination are really economic values, and as lamps are further improved, the recommended levels are expected to go higher.

Tests such as those which Professor Moon's group have conducted are valuable in their confirmation of the worth of research and experimentation designed to carry illumination improvements farther. In the meantime, John Citizen can co-operate by heeding incidental conclusions reached by the Moon group, which recommend that a desk top be as light in color as the book which is being read on it, and that walls be of light color in order to maintain uniform brightness over the whole visual field.

Evolution in Ice

IN 1920, ice was virtually the only refrigerant available for domestic use. Half the homes in the United States had iceboxes. Only some ten thousand families had found the courage and the cash—\$600 on the average—to install the noisy, cumbersome electric refrigerators of that day. Twenty years later the situation had been practically reversed. Almost half of this country's families now possess mechanical refrigerators, and the iceman visits only that part of the remainder which enjoy any refrigeration at all. The trend is still, or was before priorities scuttled the law of supply and demand, strongly against the kitchen icebox. In 1937, for example, about four mechanical refrigerators for domestic use were sold for every ice unit.

Needless to say, the manufactured-ice industry has staggered under the effect of what is probably the most drastic upheaval of market which it has experienced in its century-old existence, yet it has not suffered so much as the magnitude of the change would lead one to expect. The number of ice-making plants, while lower than in 1929, is substantially higher than in the middle Twenties, and the industry's output—about forty million tons a year, or six hundred pounds per capita—is not far from peak figures.

Among the factors that have lessened the shock is the increase which has occurred in the use of refrigeration — in food and chemical industries, air conditioning, and so on. Ice is used to cool concrete, lower heavy structures into place, and make artificial ski jumps. Another reason the ice industry has been able to withstand the competition is the fact that it has suffered proportionally less disturbance among commercial users than in the domestic field. Commercial users give more weight to the most important asset of ice, its low cost per British thermal unit absorbed. Ice has the additional advantage, especially potent in transportation, of requiring no complicated apparatus, no power and cooling systems. Almost all refrigerated freight cars and many trucks employ ice; the faithfulness of these specialized transport units to it is bolstered by the fact that they make much of their mileage while empty. For like reasons, ice is widely used to cool railroad passenger cars.

In the face of competition, the ice industry is also showing that resourcefulness which seems almost characteristic of old industries confronted with technical innovations designed to eliminate them. As it does with living creatures, adversity seems to quicken the rate of change, the ability to improve products and processes. Among the more or less typical properties of ice as a cooling means is its ability to maintain a relatively high humidity in the refrigerator, a property which is being exploited in new designs of iceboxes. The relative humidities at which foods suffer least deterioration are generally quite high, being about 90 per cent for fresh meats and about 80 per cent for such items as butter, cheese, and eggs. Some ice refrigerators now incorporate fans and thermostats to maintain optimum conditions. An indication of the importance attached to the humidity factor is the trend visible in the electric-refrigerator field toward larger cooling surfaces, which means less temperature difference between the surfaces and the air and less condensation of moisture.

An interesting development of the past ten years has been the introduction of ice "sized" to meet specific consumer requirements. Designated by such names as "snow," "ribbon," "rice," "chestnut," "walnut," and "egg" (reflecting the connection of the ice with the coal business), the forms range from particles less than onequarter inch in size to cubes considerably larger than those commonly used in drinks. With far greater area per unit mass than block ice, these forms melt faster and therefore give lower temperatures than do the blocks. Snow ice in particular is finding a large use in the shipping of vegetables, fish, and dairy products. When foods are shipped by freight car, blocks of ice are customarily fed into portable machines which crush the blocks into "snow" and then spray the small flakes over the load until a blanket perhaps six inches thick and weighing on the order of eight or ten tons is built up. Such a blanket is more nearly impervious to heat flow than are chunks of ice scattered over the load; as the snow ice melts during transit, cold water trickles uniformly over the vegetables, keeping them moist and crisp. Foods which must be kept dry, of course, cannot be top iced. Snow ice, naturally enough, is also used by Hollywood as snow, and it has likewise been applied to toboggan and ski slides when nature failed to provide.

A still more recent wrinkle is antiseptic ice. Developed on the Pacific Coast for the use of the fishing fleet, this type is made from water to which has been added an appropriate antiseptic. Marked reductions have been reported in the number of bacteria counted on fish thus stored for many days in the holds of vessels.

Before Fulton

The Designer of the Clermont Was Able to Draw on Skillful Work Done by Various Predecessors in Applying Steam to Navigation

By W. MACK ANGAS

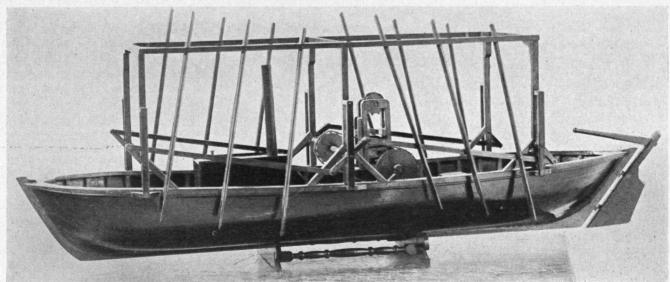
ISTORIANS differ as to the real importance of the contributions made by Robert Fulton to the development of steam navigation. The authors of American school histories, after paying scant tribute to the earlier work of John Fitch, usually credit the invention of the steamboat to Fulton. Many writers who have dealt with the subject more extensively are inclined to belittle Fulton and represent him as an opportunist who originated nothing but who discovered ways of exploiting the inventions of others in a successful business enterprise. The truth probably lies between these extremes. Beyond question, the Clermont was the first commercially successful steamer, and honor is due Fulton for building her and proving that the steamboat could be something more than an interesting novelty. On the other hand, it is now generally appreciated that Fulton did not invent but improved and developed the steamboat. Furthermore, as will be shown, the work of his predecessors and contemporaries gave him a rather broad foundation upon which to build.

Propulsion of vessels by paddle wheels turned by oxen working treadmills was well known to the Carthaginians, by whom such vessels were introduced into Sicily, where the Romans obtained a knowledge of them. Steamboat experimenters, therefore, had available a proved method of making a rotating shaft drive a boat, and their problem was essentially to make a steam engine of reasonable weight and power turn the shaft.

Had some of them realized that this was the problem and ceased experimenting with mechanical oars and "duck's foot" propellers, the practical steamboat might have been produced several decades earlier. Perhaps this statement is unfair to the earlier inventors, as, until Watt patented a practical steam engine with a rotating shaft in 1781, the only steam engines in common use were reciprocating pumps without shafts or flywheels, and the only satisfactory way to make one of these pumps drive revolving machinery was to use it in conjunction with an overshot wheel.

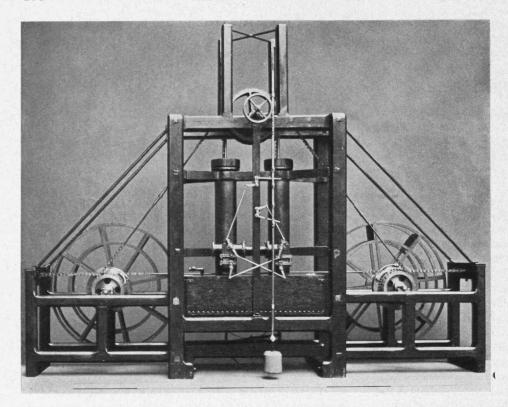
The earliest alleged substitution of steam power for the work of animals or men to drive a paddle-wheel vessel comes from Barcelona, Spain, where Blasco de Garay, on June 17, 1543, was supposed to have exhibited to a commission appointed by Emperor Charles V a vessel of 209 tons called La Trinidad, which was driven with tolerable success by paddle wheels turned by steam power. This story was first published in 1825 by Thomas Gonzales and was no doubt given wide credence, as he claimed that it was based on "documents and original registers kept in the royal archives of Simancas, among the commercial papers of Catalonia, and from those of the military and naval departments for the said year 1543."

An examination of the Simancas documents which was made by John MacGragor in September, 1857, disclosed, however, that while Blasco de Garay had indeed



Smithsonian Institution

Model of John Fitch's steamboat of 1786. The vertical paddles were given a stroke somewhat akin to that given a canoe paddle.



Symington's original marine steam engine of 1788, in the Science Museum at South Kensington, England. This machine was used in Patrick Millar's pleasure boat, a catamaran. Note the elaborate ratchet devices to produce rotary motion from the reciprocating motion of the piston.

written letters describing experiments made in 1543 with two vessels propelled by paddle wheels, the wheels were turned by men.

While the story of Blasco de Garay's Sixteenth Century steamer is almost undoubtedly false, evidence shows that in the following century at least two men conceived the possibility of steam navigation. The first was David Ramseye, to whom Charles I of England granted a patent on January 21, 1630, among the specifications of which were "to raise water from low pits by fire" and "to make boats, shippes, and barges to go against strong wind and tide." Records do not indicate, however, that Ramseye made any attempt to put his ideas into practical use. The story, once widely circulated and accepted, of the Marquis of Worcester's supposed conversation with Salomon de Carrs on the possibilities of steam power and even steam navigation may be dismissed as a hoax, but, in a little book published in 1663, the Marquis mentioned the possibility of using steam power for pumping water. No further serious consideration of steam navigation is recorded until the end of the Seventeenth Century, when Denis Papin's investigations of the subject commenced.

Papin, a French physicist and one of the inventors of the steam engine, was born at Blois in 1647. After serving as an assistant to Huygens and later working with Boyle in London, he was appointed to the chair of mathematics in the University of Marburg. In 1690 he published a methodical description of a fire engine, later known as the atmospheric engine, and suggested the practicability of applying the power of steam to the navigation of rivers. In 1695, in another publication, he said: "It would be too long to describe here in what manner this invention [the atmospheric engine] could be applied to drain rivers, throw bombs, and row against wind. I cannot abstain from remarking how much this

power would be preferable to that of galley-slaves to navigate with rapidity to sea." He criticized the use of men as motive power of ships and observed that his pumps would be less cumbersome. "But," he added, 'as they cannot be conveniently adapted to ply common oars, it would be necessary to apply to them rotatory oars." He mentioned seeing such oars fixed to the axletree of a boat belonging to Prince Robert of Hesse, the power for turning them being furnished by horses, and expressed the belief that they might be put in motion by a steam engine. Thomas Savery in 1698 began experimenting with crude steam pumps, finally evolving a form of pump in which steam under pressure acted directly upon the water in two working chambers, the whole affair being a striking resemblance to the modern pulsometer.

Papin in due course refined Savery's pump by introducing a float between the water and the steam to reduce condensation losses, and in 1705 Newcomen carried the idea further by separating the steam and water cylinders, thus giving the world a practical if wasteful steam pumping engine which came into wide use as a mine and colliery pump. Undoubtedly Papin knew of Newcomen's work. Though some historians deny that Papin ever put his schemes for steam navigation to practical test, George Henry Preble, Rear Admiral in the United States Navy, said that "his correspondence with Leibnitz, which has recently been brought to light, fully proves that he actually constructed a steamboat which he navigated upon the river Fulda in 1707, which boat may serve as a warning to men not to be too clever for their age. M. Fournier relates that Papin labored at his construction for some years at Hanau, and that at Cassel the boat was launched in the presence of the landgrave. The experiment succeeded, but he derived from it only scorn, ridicule, and abuse. He was treated as a charlatan and a fool. Disgusted with the conduct of the Hessians, Papin attempted to go to London in his steam vessel. He descended the Fulda as far as Münden, and was entering the Weser, formed by the union of the Fulda and Werra, when the boatmen of Münden, envious or suspicious of what might arise from the invention, laid violent hands upon him and his boat. He escaped with difficulty, but his boat was destroyed. He tried in vain to obtain redress; and then came to reside in London, where he died three years afterwards (1710) without having built a new boat."* No technical descriptions of Papin's boat are available, and the drawing which shows its destruction is no doubt highly imaginative. We have no idea of how Papin made his engine turn the paddle-wheel shaft.

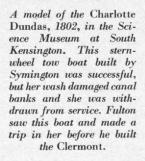
Whether Papin actually built a steamboat, as Admiral Preble is convinced he did, there can be no doubt that the Eighteenth Century produced many men who published descriptions of various schemes for driving vessels by steam power. Among these were Jonathan Hulls, Gautoir, Bournoulli, Euler, and Genevois; but there is a vast gulf between speculating over the possibility of an invention, perhaps even describing it at some length, and making it work. Hulls seems to have given more thought and time to the subject than did the others, and in 1736 he obtained a patent in England for a "machine for carrying ships and vessels out of or into any harbor or river against wind and tide." In a pamphlet published the following year, Hulls described his invention, which was a stern-wheel tug driven by a condensing steam engine. Though Scott Russell, codesigner and builder with I. K. Brunel of the Great Eastern, credits Hulls with the actual construction of

* A Chronological History of the Origin and Development of Steam Navigation (Philadelphia: L. R. Hamersly and Company, 1883), page 6.

such a vessel which was usefully employed, other historians express the opinion, now generally accepted, that he failed to secure financial backing for his project and died in poverty and obscurity without seeing his invention tried.

France, with its many navigable rivers and canals, produced several experimental steamers in the latter part of the Eighteenth Century. The first two, built by the Comte d'Auxiron in 1774 and Perrier in 1775, proved unreliable and too slow to move successfully against the current of the Seine, but in 1778 the Marquis de Jouffroy d'Abbans began experiments culminating in 1781, 1782, or 1783 (the date is questionable), with the construction of a steamer of 140-foot length and 20-foot beam, which drew a little more than three feet of water. The Marquis appears to have experimented first with "duck's foot" propellers at the stern of his vessel but to have adopted later side paddle-wheels driven by a single-cylinder double-acting horizontal engine, the reciprocating motion of the piston being converted to a rotary motion of the paddle shaft by a system of racks and pawls. A drawing of this boat in the Science Museum at South Kensington, England, shows such refinements as an anchor windlass operated by the main engine. Undoubtedly the boat ran on the Saône with some success and was the subject of a favorable report to the French Academy of Sciences by Borda and Perrier. The substitution of a crank and connecting rod for the rack and pawl device would very probably have made this boat a thoroughly practical vessel, but the French Revolution forced its inventor to emigrate and thus terminated a promising experiment. When M. de Jouffroy returned to France in 1796, he found that the steamboat had already been patented there by others.

In 1783, the year of De Jouffroy's most successful experiment, a steam engine was (Continued on page 186)





Work for Women

Gainful Employment Analyzed as a Means of Avoiding Idleness Enforced upon Women as Their Traditional Tasks Are Transferred Outside the Home

BY HERBERT S. SWAN

DURING the past fifty years, household tasks performed by women have been transferred to factories and outside workshops more rapidly than women have entered gainful employment in business and industry. Sewing, baking, canning, churning, cheese making, laundering, and other domestic occupations are now for the most part carried on in large plants utilizing laborsaving machinery. At the same time, the introduction of numerous electrical devices, such as the washer, mangler, dishwasher, food mixer, and vacuum cleaner, has effected a considerable lightening and speeding up of housework. Concurrently with these changes, the birth rate has declined markedly. All these factors taken together have operated to release a considerable number of women from their usual tasks.

A portion of the women so released have found new work; they have gone into the professions, into clerical occupations, and into industry. A part of the work saved has been appropriated for increased recreation. But notwithstanding the progressive utilization of this large store of released work for constructive economic and social purposes, the development of new timesaving devices has outrun the capacity of the industrial structure to absorb the persons so displaced. The result is that, even though some twelve million women have entered gainful occupations, a considerable volume of enforced idleness has occurred among women who, but for these trends, would be busily occupied in household duties.

In view of the fact that the proper economic and social adjustment of women in the employment structure constitutes one of the major problems confronting communities and industry, it is surprising that so few attempts have been made to survey the subject, much less to develop programs for solving it. The present inquiry, while making no pretense at such a treatment, hopes to present certain broad aspects of the question which may prove important in extending the earning power and employment of women, either members or prospective members of the local employment force.

In 1940, of the total female population over fourteen years of age, 25.5 per cent were members of the work force; 74.5 per cent were not. But not all women in the work force were in productive work; 3.4 per cent of all women classified in the gainful occupations were either in some kind of public emergency work (W.P.A., N.Y.A.) or unemployed and seeking work. Housework, with 56.7 per cent of all women, engaged more than twice as many women as did business; 8.8 per cent were

in school; and of the remaining 8.9 per cent, some were unable to work, some were in institutions, others were engaged in unknown pursuits. Table 1, which exhibits these data in some detail, permits a comparison in employment status of men and women.

TA	BLE	1. Per	CENT	DISTRIBUTI	ON OF	Емр	LOYM	ENT S	STATUS
OF	THE	POPUL	ATION,	FOURTEEN	YEARS	OF	AGE	AND	OVER,
			BY SE	X, UNITED S	STATES,	194	0		-

	Total	Male	Female
In the work force	52.3	79.0	25.5
Employed except in public			
emergency	44.9	67.6	22.1
At work	43.6	65.7	21.4
With a job	1.3	1.9	0.7
On public emergency work			
(W.P.A., N.Y.A., and			
Č.C.C.)	2.4	3.8	0.9
Seeking work	5.1	7.6	2.5
Experienced workers	4.3	6.6	1.9
New workers	0.8	1.0	0.6
Not in the work force	47.7	21.0	74.5
Engaged in housework	28.6	0.6	56.7
In school	9.0	9.1	8.8
Unable to work	5.2	5.8	4.5
In institutions	1.2	1.6	0.9
Other	2.0	2.4	1.5
Unknown	1.8	1.5	2.0
Total	100.0	100.0	100.0

Women, especially young women who seek employment, prefer business to industry. Commercial, clerical, and professional employment affords both cleaner and lighter work. Then, too, something in the folkways places work in the office, the store, the schoolroom, the library, upon a higher social plane than it does work in the factory. For biological reasons, if for no other, we should expect fewer women than men in gainful occupations. Likewise, however, traditions against female employment are still a force to be recognized. The fact that it is even now not quite "respectable" for the daughter or wife of a self-reliant, though hard-working, male in the community to seek a job for pay exercises a greater restraint upon the entrance of women into business than we ordinarily think. Another factor, possibly of even greater importance, is the frequent lack of openings in types of employment suitable for women. Many would no doubt work if they could but find a job; finding none, they remain at home.

Seldom is more than one-fourth of the total female population in the average city employed outside homes. Local circumstances — a greater-than-average number of young children, a disproportionate number of elderly women, the distinctive character of the employment structure in the community, or some other reason — may alter the ratio of employed to total females, but it is usually less, not more, than one to four.

Women go into industry, it appears, not so much because they prefer manufacturing to business as because of the inability of business to absorb more than a given quota of them in a particular city. White-collar work in offices and stores is, as a rule, unable to engage more than some 15 per cent of the total female population. When this quota has been filled, the over?ow must either remain "unemployed" as "housewives" or work in industry.

Much has been said about women in industry, but the fact is that comparatively few women are in industry. Only about 3.1 per cent of the total female population in the United States as a whole is gainfully occupied in manufacturing. In some cities — particularly communities with heavy industries, such as Gary and Youngstown — practically no women are engaged in manufacturing. But even in cities with more diversified industries — cities such as Baltimore, Boston, Chicago, Cincinnati, and Cleveland — the women in industry do not exceed 5 per cent of the female population. Smaller industrial cities — like Bridgeport, Camden, New Haven, Providence, Springfield, Utica, and Worcester — have a greater proportion, but in none of these does manufacturing employ more than 8 or 9 per cent.

Several factors, as already intimated, enter into an appraisal of the available supply of female workers. The average unmarried woman probably expects to withdraw from gainful employment upon marriage, or at least upon the birth of her first child. Hence the number of unmarried women available in any particular locality is defined to a considerable degree by the number of females who are between the average age of girls leaving school and the average age of girls getting married. As the spread between these two ages becomes greater, the number of employable young females increases; as it becomes smaller, the number decreases. The average age at which working-class women contract a first marriage appears to be 18½ years for those marrying unskilled workers and 19½ for those marrying skilled workers.

Marriage and education play an important role both in the rate of personnel change and in the entrance age of females into employment. Thus some firms which require elementary types of skill find the high-school girl preferable to the college graduate. Employment prior to marriage is said to average more than twice as long for the high-school girl as for the college girl. The comparatively early marriage after employment acts as a real bar to the entrance of college girls into many lines of commercial work, particularly jobs which may be filled satisfactorily by younger girls with less education.

In 1937, women made up 27.4 per cent of the total employees covered for old-age insurance. The proportion varied in different states, from 15.5 per cent in West Virginia to 37.0 per cent in Rhode Island. Throughout the country as a whole, women collected 16.2 per cent of the total taxable wages, the proportion ranging from



One of the forty thousand women who are working in British railway yards and factories during the war emergency, Miss Joyce Finn was formerly a bookbinder. Her father and her fiancé both work in the factory where she operates this drilling machine.

"Illustrated" from Black Star

Allages

7.8 per cent in West Virginia to 23.4 per cent in Rhode Island. The percentage of women to total employees and the percentage of wages paid women to total wages, are shown by age groups in Table 2. From this table it is evident that only females under fifteen years receive pro-rata higher wages than do males in the corresponding age group.

TABLE 2. PERCENTAGE OF MALE AND FEMALE EMPLOYEES AND MALE AND FEMALE WAGES, IN DIFFERENT AGE GROUPS, UNITED STATES, 1937 Percentage of Employees Percentage of Wages Age Male Female 89.4 10.6 86.5 13.5 15-19 60.5 39.5 63 6 36.4 20-24 63.6 36.4 71.7 28.3 25-29 72 6 97 4 79 0 21 0 30 - 3473.7 26.3 84.0 16.0 35-39 76.0 24.0 86.2 13.8

40-44 78.5 21.5 88 2 11.8 45-49 80.9 19.1 89.6 10.4 50-54 83.7 16 3 91 1 8.9 55-59 85.6 8.9 14.4 91.1 60-64 87.4 12.6 92 8 7 2 65 - 6989.1 10.9 93.1 6.9 704-89.1 10.9 91.0 9.0 Unknown 77.5 22.5 84.3 15.7

72.6

Although females in the age group fifteen to nineteen constitute 39.5 per cent of all employees in the United States, after age nineteen Cupid plays havoc with the female personnel in business. During the five years between ages twenty-five and twenty-nine, approximately one-fourth of all women at work leave employment; during the five years between thirty and thirty-four, almost another fourth leave their jobs. In other words, about one-half of the girls entering business leave after age twenty-five and before age thirty-four.

27.4

83.8

16.2

The proportion is far from stable in different states. Thus, in Maine only 37 per cent of the female entrants leave employment during this ten-year period, whereas in Pennsylvania 57 per cent do so. Some may be surprised that the female retirement rate for these age groups should be considerably higher in northern than in southern states. In New Jersey and Connecticut the number leaving is 55 and 56 per cent, respectively; in North and South Carolina, 42 and 45 per cent, respectively. Racial factors and regional customs are, no doubt, in large part responsible for this unevenness. Girls of foreign birth or foreign parentage have almost invariably larger families than do girls of native American stock. The woolen and worsted mills of Rhode Island, the cotton textile plants in Maine and New Hampshire, and the shoe factories in eastern Massachusetts employ a large proportion of French-Canadian women, who usually marry young and rear large families. Differences in environment, in folkways, as well as in character of employment, may perhaps in a measure be responsible for the fact that in some localities women regard marriage more as a personal matter concerning their own individual mode of life than as something which should cause an abrupt break in their manner of gaining a livelihood.

Not until age thirty-five has been passed, when the urge for marriage has somewhat dulled, is something approaching stability reached in female employment. Women constitute about 24 per cent of the employees within the age group from thirty-five to thirty-nine. But even then the proportion of women to men continues to decline, though more gradually, with each successive year, until a ratio of eight men to one woman is reached at age sixty-five.

If traditional and social restrictions are ignored, it would probably be agreed that, except as biological functions interfered, married women would in most instances be available for at least some, if not full-time, gainful employment. Certainly there is no biological basis for the absence from the gainful occupations of those married women who have no children — and statistics show that 16 per cent of married women remain childless. Women who bear children today, moreover, have so few offspring that the maternal functions are not so exacting as they were a few decades ago, when large families were the rule. Present-day women, likewise, complete their families at a much younger age than did their mothers and grandmothers. The number of children born per one hundred wives under forty-five years of age is, for example, in such a city as Syracuse, 130 for families of professional men; 150, for businessmen; 190, for skilled workers; and 280, for unskilled

Without maintaining that all women not actively engaged in bearing and nursing children should work outside the home, it is nevertheless interesting to have some kind of a picture of the potential number of women who might, after discharging obligations to the future generation, be available for gainful employment.

Data showing number of births per woman in different age groups in cities are difficult to obtain. For Ohio, however, we have the specific birth rates by age in urban areas in 1930. These are shown in Table 3 for all women and for married women per 1,000, making the assumption that all children were born in wedlock.

	Number Number of Un- of married Married Women Women		Number of Births All Married Women Women		Estimated Minimum Per Cent of Married Women Bearing No Children
Age			w omen per 1,000		in the Quinquennium
15-19	901	109	46.1	420.3	58.0
20-24	488	512	118.0	230.4	77.0
25-29	252	748	-105.7	141.2	85.9
30-34	220	780	73.3	90.1	91.0
35-39	201	799	43.0	52.5	94.8
10-44	190	810	15.3	19.1	98.1
45-49	187	813	1.5	1.9	99.8

Were a generous maternity leave, away from all outside work, allotted mothers for each child born, a very considerable reservoir of employables would exist among married women not now seeking opportunity in commercial employment. The last column in Table 3 presents an estimate, within each respective age group, of married women bearing no (Continued on page 192)

Machines to Build Machines

Lathes and Planers the Forerunners of the Machine Tools Prominent in Today's Headlines

By LEROY L. THWING

Por the first time, machine tools are in the headlines; everyone has heard of them, but some are uncertain just what they are. The earliest noted use of the term is in the American Artisan, a journal for machinists published during and after the Civil War. "Machine tool" was then a new expression, for the editor was the only one who used it. Evidently it was accepted in the trade, however, for in 1879 Frederick Miles of Philadelphia established a Machine Tool Works and advertised lathes, planing machines, and steam hammers. All do not agree that a steam hammer is a machine tool, but no dispute arises as to lathes and planers.

These are in fact the progenitors of all our machine tools, although lathes are two thousand years older than planers. Lathes will produce cylindrical surfaces, and planers will produce flat surfaces. As most working surfaces in almost every machine are either cylindrical or flat, practically all machine parts could be made in either lathes or planers.

No record of metal turning exists prior to 1700, although there is an Egyptian wall painting of a lathe dating from about 300 B.C. A late medieval sketch shows a bell mounted on a crankshaft supported on two wooden horses. The implication is that this was turned by hand to smooth the bell, but the result may have been accomplished entirely by the use of abrasives and not by cutting tools.

Fig. 1. Metal-turning lathe, 1701. From Plumier.

The earliest known pictures of metal-turning lathes and instruction in the use of them are found in L'Art de Tourner, written by Charles Plumier and published in Paris in 1701. In a chapter on making arbors, mandrels, and spindles for lathes, Plumier says: "The importance of having an exactly round spindle for a lathe, and the impossibility of doing this with files, has caused me to inquire diligently among those workmen who claim to be able to turn iron readily. But in all my travels and with all my searching, I have found but two men who can do this to my satisfaction. One is a coiner at Rome, Signor Guillelmo, and the other, Pierre Taillemars, the instrument maker of Paris . . . who cuts iron and steel as readily as Maubois, the king's famous turner, cuts ivory and ebony. . . . His tools [at the point] are about one-eighth inch wide and one-half inch thick, sharpened to a 45-degree angle. . . . Moreover, he selects the very best of German steel, which he tempers hard and draws only to a yellow. Holding the tool firmly on the rest, he so inclines it . . . that it takes the proper cut. . . . He often dips the tool in cold water lest its temper be drawn. This manner of turning calls for a strong wrist and great skill if the work is to be truly round and smooth."

The types of lathe, lathe tools, and methods described by Plumier in 1701 were used almost exclusively during the entire Eighteenth Century. Even cannon were turned — but not bored — with hand tools, and as late as 1850 small brass parts were turned in foot-driven pole lathes.

Plumier gives us a drawing of a metal-turning lathe (Fig. 1) showing the solid tool-rest and one of the hooked tools. The drive is not shown, but a pulley would be driven onto the piece being turned and would be rotated

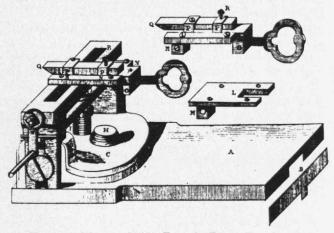


Fig. 2. A slide rest of 1752. From the French Encyclopedia.

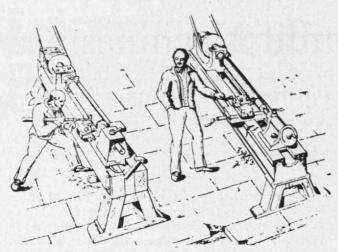


Fig. 3. A contrast between the slide rest and the previous method of holding tools by hand, as presented in an old print reproduced by courtesy of the American Machinist

by a cord from a "great wheel" turned by one or two men (Fig. 6).

The first improvement in lathes was the addition of a headstock with two bearings and a permanent pulley. In earlier lathes, the only revolving part was the work itself, turning on two dead centers. How common lathes with headstocks were, prior to 1800, we do not know. Toolholders and slide rests were the next improvement. Although a slide rest much like those now used on bench lathes was sketched in a Fifteenth Century engineer's notebook (F. M. Feldhaus, Die Technik der Vorzeit, der Geschichtlichen Zeit und der Naturvölker, Abb. 149), it is unlikely that any such device was constructed as early as this. Small screw-cutting lathes with either toolholders or slide rests were probably first built in the Eighteenth Century by clockmakers, gunsmiths, and instrument makers for their own use, but we know little about these early machines. Presumably these improved lathes were first built by French mechanicians, but as the French excelled only in small work, the practical development of lathes - and planers - was in England. French mechanics contributed little or nothing toward the development of industrial machinery. For example, the slide rest illustrated (Fig. 2) in the French Encyclopedia of 1752 was not intended for use on an ordinary metal-turning lathe but on a special lathe for cutting the intricate geometrical patterns now engraved on currency and stock certificates. This fact is significant, as it indicates that in 1750 no great demand existed for lathe-turned machine parts.

Henry Maudslay, an Englishman, is rightly credited with the development and practical application of the slide rest, and particularly the sliding carriage, to metalturning lathes. While he may have known that slide rests were used on the Continent, we have no evidence that anybody, anywhere, prior to 1797 mounted one on a sliding carriage with an automatic feed. Indisputably, Maudslay was the first of a succession of English mechanics and engineers to whom we owe the evolution of machine tools, the development of which was of course greatly stimulated by the invention of the steam engine and the spinning frame. Maudslay's first lathes, built in the last decade of the Eighteenth Century, were

small; but in 1830, a year before he died, he built a pit lathe with a nine-foot faceplate, fitted with a boring bar for cylinders up to ten feet in diameter. The average shop of that time was not necessarily equipped with lathes with sliding carriages, as the plain turning-lathe with only a tool rest continued to be used for many years. The difference between the old and the new type of lathe is shown in Fig. 3, which dates from about 1840. Note the long hand-tool used by the workman at the left. Crutch-shaped toolholders enabled the turner to force the tool into the work. Many an old-time machinist learned to turn metals with hand tools before he was allowed to work at a lathe whose carriage was drawn back and forth by a chain.

The invention of the metal-planing machine has been claimed for the French but only in a narrow technical sense. The machine commonly cited as the first metal planer was invented in 1751 by Nicolas Focq, a French clockmaker, and was intended to machine pump cylinders. It is shown in various later publications, but the original cut (Fig. 5) appeared in a contemporary publication of that time, Recueil des Machines et Inventions Approuvés par l'Académie Royale des Sciences. This pump cylinder was presumably to be used in engineer Marly's costly hydraulic system to supply water for the fountains at Versailles. Robertson Buchanan, in Practical Essays on Mill Work and Other Machinery (London, 1841), illustrated and described the machine and either knew or assumed that it was actually built. It was designed to "bore" cylinders by means of a cutting tool having an axial, straight-line movement. The cylinders must have had some kind of rotary feed not shown in the cut. However satisfactorily or badly it may have functioned, it is the first known metalworking machine in which the relative motion of the tool and the work was along a straight line. Technically this machine would be a planer. A planer for wooden moldings, shown in the French Encyclopedia of 1752 (Fig. 4) is more nearly in accord with modern design. That either this or Focq's design had any influence on the development of metal-planing machines is, however, doubtful.

According to Professor Joseph W. Roe, author of English and American Tool Builders, the first planer known to have been built was designed by Richard Roberts about 1817. It is still in existence. The chisel and scraper marks on the ways and bed prove that it was not built with the help of another planer. The platen has the chain drive so often found on planers

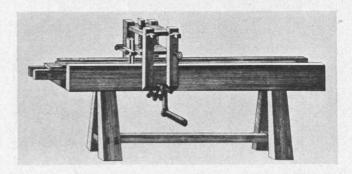


Fig. 4. Machine for planing wooden moldings, 1752

constructed in this country before 1840. About 1828 Joseph Clement built his "great planer," which for ten years was the only one of its size in England. Notwithstanding the fact that it would take work seventy-two inches wide, it was driven entirely by man power. Such was the demand for the work it alone could handle that it is said to have run twenty-four hours a day for a number of years, earning no less than \$100 a day for its owner.

In this country, a few lather and planers built around 1835 were still in use at the turn of the century. The lathes continued to bear traces of designs of the days when the beds were made of wood with iron tracks or vees. They were later called "chain lathes" because the tool carriage was drawn or fed along the vees by a chain and sprocket wheels instead of by the rack and pinions used in later years. The heavy chains which were used on planers wound and unwound on drums at either end of the bed. The drum at the front was smaller for leverage and power needed during the cutting stroke; the rear one was larger in order to enable a quick return which, we may be sure, was not very speedy. The first large planers built in this country probably had vertical drums, which were rotated by either horses or oxen, but we have no direct evidence of this fact. The platens of other planers were driven by long screws running the entire length of the bed of the machine. A planer that the writer has seen many times had the date 1844 cast in the head. It was a 48-inch planer; its screw, which had square threads, was about four inches in diameter and at least eighteen feet long. A screw of this size was quite an achievement for those days. In 1844 mechanics knew little or nothing about gear-tooth forms, and if they had had such knowledge, no machines would have been available to cut the racks and gears now commonly used to drive the platen of a planer. The molding planer illustrated in Fig. 4 has a rack and pinion drive, but these are made of wood, and the form of the gear

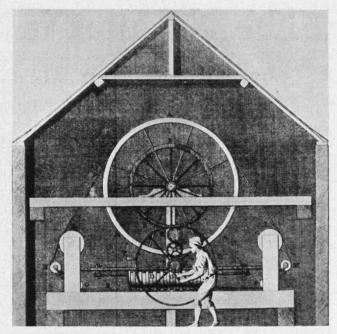


Fig. 5. Machine for planing the inside of cylinders, 1751

teeth is evidently based on neither involutes nor epicycloids.

The shaper and the slotter are the only other machine tools in the planer group. Screw machines, grinding machines, vertical boring mills, and possibly upright drills have developed from the simple lathe. One other important machine tool—the milling machine—seems to be in a class by itself. Fundamentally the milling machine depends on a rotary cutting tool, such as a drill, but the milling cutter is used on external and not internal surfaces. The original milling cutter was a rotary file, and the first milling machines, which were gear cutters for clock wheels, (Concluded on page 197)

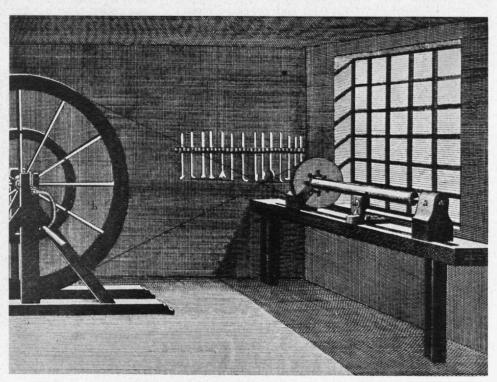


Fig. 6. A metal-turning lathe of 1751, driven by a "great wheel"

The Navahos in the Machine Age

How a Primitive People through Unusual Capacity for Adaptation Have Prospered in Technological Times

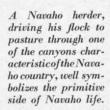
BY CLYDE KLUCKHOHN

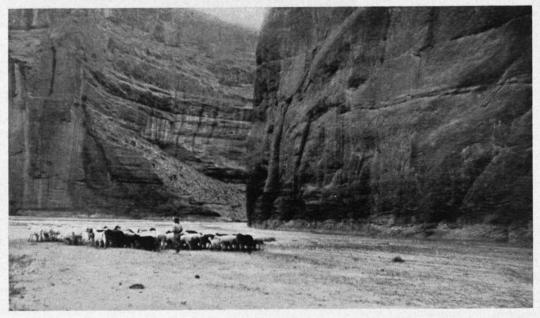
THE United States are unusual in their juxtaposition of the extreme of technological culture with groups which are still primitive if not fairly close to the aboriginal. In other parts of the world, as in the Dutch East Indies, the technological culture, though highly developed, is relatively a minor part of the whole social complex and is restricted to a small group in the total population. Here, however, the aboriginal or primitive culture is the small part; yet the technological culture, which is developed to the highest and most aggressive degree, has not extinguished the primitive.

A fifth columnist who, by mistake, dropped by parachute into the interior of the Navaho Reservation would feel himself very far from civilization. The first human beings he met would almost certainly speak no word of any European language. They probably would have seen airplanes in the sky previously, but they might well never have seen a locomotive. If he were so lucky as to find an English-speaking Navaho, our fifth columnist would doubtless discover that he was within thirty miles of a trading store operated by whites and perhaps even that near to a post office. But the post office might be (as is that at Kayenta, Ariz.) 165 miles from the nearest railroad station. The extent and reality of the isolation of some of these Indians from our world may be illustrated by a dramatic instance: As late as 1924 I saw adolescent Navahos who had never previously seen a white man. Their parents had not allowed them to visit the not-too-distant trading posts, fearing that the white trader might for some reason take it upon himself to cause a government agent to carry the children off to a school.

The Navahos are the largest Indian tribe in the United States. In 1868, they numbered but fifteen thousand some authorities say only eight thousand. Today, there are about fifty thousand of them. The increase is the more startling because their linguistic and cultural congeners, the Apaches, have hardly more than maintained their numbers during these same two generations. The determinants of Navaho population growth are probably manifold, but of one factor there can be no doubt: the Navaho capacity for adapting to a capitalistic, competitive, individualistic economy. The old saw, "Let's give the country back to the Indians," is no longer a pleasantry among many stockmen of New Mexico, Arizona, Colorado, and Utah. The Navahos are taking the country back. Each year, as their numbers grow, they spread over more range beyond legal limits.

The Navahos, then, are distinguished among American Indians by the ease and alacrity with which they have adjusted to the impact of our culture while still retaining many aboriginal traits and very definitely preserving the coherent framework of their own cultural organization. It is almost true to say that in some areas the culture of the Navahos has altered more in the past generation than has the culture of their neighbors, the Pueblo Indians, in the whole four hundred years during which these town-dwelling Indians have been in





sustained contact with European civilization. The purpose of this paper is to examine the nature and range of this adaptation in one aspect of Navaho life — material culture.

Although the Navahos are first mentioned in European (Spanish) documents in 1626, their contacts with Europeans prior to 1866 can be summarized as transitory and casual. True, between 1626 and 1866 the Navahos acquired domestic animals (sheep, goats, horses, and a few cattle), firearms, and metal objects, sometimes by raids on Spanish or Pueblo Indian settlements, sometimes through peaceful relations with the Pueblos. A little knowledge of the European techniques of using these possessions was likewise undoubtedly taught by captives. But to make an alien technology part of a new culture requires not merely the objects but equally the time for a sizable number of representatives of the acquiring culture to learn the trade. Thus, while there were blacksmiths among the Navahos as early as 1840 and at least one silversmith as early as 1855, neither of the crafts which they represented had any significant influence upon Navaho economy until after 1870.

During the year 1863–1864, some eight thousand Navahos were rounded up by forces of the United States Army under the leadership of Colonel Kit Carson and were taken to captivity at Fort Sumner, N. M. There they remained as prisoners for four years, in intimate and unremitting contact with our material culture. When, in 1868, the Navahos were allowed to return to their own country, the United States Government made systematic efforts (which have been continued ever since) to teach the Navahos many aspects of our technology.

The intensity of these relations must not be overestimated. The Navaho country is enormous (about sixteen million acres) and, except on its southern border, isolated from railroads and main highways. Within this vast area, schools and other agencies of governmental influence were few and far between until very recently. Moreover, roads were infrequent and poor, for the Navaho Reservation is a typically rough, rocky, and intensely dissected plateau where road building is difficult and expensive and where one torrential summer rain can ruin anything short of a surfaced highway. It is, of course, this insulation from our society (plus their own numbers) which helps to explain the fact that in 1942 the culture of the Navahos still retains its integrity and coherent form in spite of the many borrowings from Western technology.

Seen against the perspective of other early New World cultures, Navaho material culture was basically very simple. The architectural skills of the Mayas were altogether unknown. The Navahos built huts which were comfortable but rude. The construction of them involved hard labor and a little ingenuity in one or two matters of jointing but showed absolutely no trace of sophisticated engineering. Navaho stone-carving was crude in the extreme when contrasted with that of the inhabitants of the so-called Mound Builders area. The Navahos completely lacked the metallurgical knowledge and the subtle dyeing techniques of pre-Columbian Andean civilization. Pottery, weaving, and silversmithing were the only crafts of any complexity. Of these, true Navaho pottery was a rough cooking ware. For a relatively brief period painted pottery was made by a few individuals, but these decorated pots were merely inferior imitations of Pueblo models. Weaving techniques were almost certainly also derived from the Pueblo Indians, and hardly more than a few centuries ago. Silversmithing was learned even more recently from the Mexicans.

The simplicity of Navaho material culture is not to be traced entirely to the accidents of historical experience. As a people, the Navahos appear to be rather poorly gifted mechanically. Some nonliterate groups, like the Eskimos, have a deserved fame for the ingenuity of the devices they have developed to face a severe environment. The Navahos seem, by contrast, singularly uninventive. In modern times I have seen only one contraption that was apparently a local development: a kind of box arrangement used as a highly primitive hay baler in Canyon de Chelly. While the Navahos



In the dooryard of a trading store, Navaho loungers by their garb record the history of their contact with white culture.

came to surpass the Pueblo Indians as weavers, this superiority was gained not by technological advances but by the aesthetic imaginations of the Navahos. As far as I know, the wedge weave is the only variation of ordinary Puebloan tapestry-weaving technique. The Navaho, I am afraid, is a far better artist than he is engineer. A physician who has lived both among the Navahos and among the Eskimos put this point very well when he said, "The Eskimo has the temperament of a surgeon; the Navaho, the temperament of a psychiatrist."

With these generalizations as a background, let us see what proportion of Western traits these adaptive people have taken over, what is the nature of the adaptations they have made, and which sectors of their material

culture remain at the aboriginal level.

The basis of the food economy continues to be agriculture, as it was when the Navahos were first mentioned in Spanish documents. Though maize and squash are still the staple crops, melons are a valued adjunct, and in some areas beans, wheat, and oats are of importance. Close to the railroads and to centers of white influence metal ploughs, barbed-wire fences, and the like, are the rule today. In more remote areas digging sticks and brush fences are yet common. The old heliacal and other ceremonially enjoined planting arrangements have essentially disappeared everywhere, but only the more acculturated Navahos plant in rows rather than in hills which was the universal American Indian pattern. Although floodwater farming remains basic, irrigation is practiced in some places. Simple exoteric magical rites persist — but so do they in European peasant and American folk cultures. The Navahos, encountering no ritualistic resistance, have taken over our agricultural technology in so far as they have become familiar with it and to the extent that they have been able to purchase factory-made equipment. In sharp contrast,



One phase of the history of changes in Navaho culture through contact with white civilization is summarized here. The old woman — she is more than ninety years old — uses the white man's sheet-metal container to hold the pinyon tree pitch with which she daubs a basket to make it waterproof.



Youth is as active as age in the Navaho world. The older daughter here husks corn, which is being roasted on a metal grille as the familiar agateware coffeepot bubbles on the fire. In the background, the mother weaves a Navaho blanket.

many of the Pueblo Indians today continue to thresh in the fashion described in the Bible in spite of full familiarity with the combine and plenty of money to buy such devices.

The importance of domestic animals in present-day Navaho economy has often been exaggerated. An appreciable number of families have no food animals at all, and many families can eat meat only infrequently. But Navaho herders, especially the women, will lavish time and effort to preserve an individual animal. I have often seen a woman sitting for hours at a time with several newborn lambs under her capacious skirts when an unseasonal snowstorm has occurred at lambingtime.

Most Navahos are good botanists. Some of their medicine men can distinguish as many as four hundred species and know one or more uses for each; and almost any adult can find and use a hundred different plants. Today the herbs are employed mainly in folk remedies and in curing-ceremonials. Almost every family, however, will have a few dishes of greens during the summer, and the fruit of several species of cactus is gathered to make confections. The poorer families utilize certain seeds as cereals. But whether any families today receive more than one or two per cent of their total subsistence from gathering food plants is doubtful.

Similarly, hunting contributes but a small fraction of the daily fare. Deer, antelope, and the larger game animals must be hunted ritually, and since such ritual hunting is seldom carried out today, game counts for virtually nothing in the Navaho budget. In most regions the weapons are now guns, but in certain isolated corners of the Navaho country bows and metal arrows are still in use. Steel traps are employed by the poorer families in obtaining prairie dogs and other animals. Aboriginal traps are now limited to the catching of birds for ceremonial purposes.

Food preparation is much closer to the aboriginal tradition than is food production. Except for coffee, tea, wheat flour, occasional canned goods, and the use of flesh of domestic animals, (Continued on page 194)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Adjustment to War

Institute's Contribution to the Nation's War Effort Studied by Faculty and Corporation

THE Institute does not plan to adopt the extreme speed-up plan which so many liberal arts colleges have announced as a war emergency measure, it was made public following action by the Corporation on January 7 in approving a faculty recommendation to this effect. A careful analysis convinced the Institute's governing bodies that adoption of the speed-up plan would weaken rather than strengthen this institution's total contributions to the war effort and would retard rather than expedite effective service by its students. The decision was reached after wide discussion with army, navy, and industrial officers who are thoroughly aware of the urgent need for well-trained engineers and scientists.

In discussing this decision, President Compton emphasized the great difference between the significance of this problem to the liberal arts colleges and to the technological colleges and the danger lest a course of action proper for the former should be forced on the latter. The war is a technical affair on a gigantic scale, demanding — both for the industrial production of technical equipment and for its operation by the armed services — many more scientists and engineers than are available. The need is for hundreds of thousands, perhaps a million, engineers and for tens of thousands, perhaps several hundred thousand, more physicists and chemists. Many of these must be trained in the most advanced aspects of their professional fields. This training is the great challenge to the engineering and scientific schools.

The principal objection to the speed-up plan — which contemplates continuous concentrated college study, summer and winter, after secondary school graduation — is that the additional yield would consist at the most of only about twelve thousand engineering graduates in the entire country, regardless of how many years the speed-up program is continued. This gain would be offset by inferior training and by necessary curtailment of the special emergency training courses through which the engineering colleges are now turning out technical specialists in much larger numbers than they are graduating regular students.

The need for well-trained engineers and scientists is recognized by the Selective Service System, which recommends that students in these fields who give evidence of professional promise be permitted to complete their academic programs. Similarly Britain has been forced, through the technical requirements of the war, to place scientists and engineers in special categories — even to the extent of forbidding their engagement in the

war effort outside the field of their professional competence. The situation of liberal arts colleges is very different, for obvious reasons. Here there is no vigorous level of professional training which must be attained before the student becomes useful in the war effort. Furthermore, the liberal arts student is normally subject to draft before graduation, and hence the speed-up plan arises to permit his graduation before he reaches the minimum draft age.

Though not favoring the extreme speed-up plan, the Faculty voted to accelerate the program for this year's senior class to permit graduation on April 27 and authorized substitution of special study and training in subjects important for the war effort in place of certain professional and nonprofessional requirements of the normal curriculum.

The judgment of Faculty and Corporation regarding the extreme speed-up plan is embodied in the following statement:

- (1) Past experience amply proves that the full speedup program turns out immature graduates of inferior training and stale mentality. The severity of such an accelerated schedule, at least in professional work, may impair the morale, health, and accomplishment of the students.
- (2) Such a program will hinder rather than help the national effort during the first critical years of the war, since young college men who could and would find employment in war industries during summer vacations will be deprived of the opportunity. Under this program they could contribute nothing to the war effort during the next several years when man power will be so urgently needed. Summer employment in industry, moreover, is an important part of technological education, and this training would be lost.

(3) However long the speed-up plan is continued, the net gain in number of graduates is that one class is graduated about a year earlier than normal. After that, the succeeding classes are graduated at yearly intervals just as at present. The speed-up does not increase the number of students entering college nor, therefore, the number graduated.

(4) Loss of opportunity for summer earnings makes the plan impossible for many worthy students, unless they receive government subsidies or loans. Under this plan it is impossible for students to make up deficiencies, to anticipate subjects, or to get in step with the regular curriculum when they have irregular status.

(5) The plan leaves no place for the army requirement of summer training for Reserve Officers' Training Corps students. Postponing this training until after graduation is an unsatisfactory alternative which renders illusory some of the apparent gain of time and fits no present army schedule. Normally about one-third of

Institute students complete the voluntary advanced R.O.T.C. course, and the applications for enlistment are not expected to increase.

(6) The plan will interfere with the Engineering, Science, and Management Defense Training Program which is now being so successfully operated under the auspices of the United States Office of Education and which is training upwards of one hundred and fifty thousand men to meet shortages in war industries.

As opposed to this total speed-up plan, the administration and Faculty of the Institute believe that the national effort requires a strengthening rather than a weakening of technological educational programs. This strengthening is the more imperative since the war and our long-term national progress call for men of superior

education in science and engineering.

The Institute believes that a sounder program in behalf of the national interests would be: (a) to leave the freshman year as at present; (b) during the summer following the freshman year, to schedule summer school for all Courses which now require summer study in this or the following year (this summer work is mainly in the laboratory or surveying camp), and in Courses where summer work is not demanded, to require students to work in war industries; (c) to leave the sophomore year as at present; (d) during the summer following the sophomore year, to require students to work in war industries or to take special military, R.O.T.C., or defense training programs as may be approved by the Faculty; (e) to leave the junior year as at present; (f) to begin the senior year in June immediately following the junior year, with graduation in January; (g) to make a special effort during the emergency to accommodate freshmen beyond the present limitation of about six hundred to the extent that there are increased numbers of applicants of superior qualifications, and within the limitations consistent with good performance as imposed by available staff and laboratory space; and (h) to continue the present practice of permitting qualified students to anticipate subjects or to take advanced standing in subjects in which they have not been enrolled, thus expediting their completion of graduation requirements.

In announcing this program as the one in its judgment best designed to yield maximum educational results in the light of present national needs, the Institute realizes that new or altered conditions may arise which will dictate a different program. At present, however, it believes that this program is preferable to the more extreme speed-ups which are being widely discussed and which are more adaptable to liberal arts colleges than to

technological institutions.

Dean of Science

GEORGE RUSSELL HARRISON, Professor of Physics and Director of the Institute's Research Laboratory of Experimental Physics, has been appointed dean of the School of Science, a post in which he will succeed Samuel C. Prescott, '94, Dean of Science since 1932, who will retire on July 1.

As one of the country's distinguished physicists, Dr. Harrison is widely known for his accomplishments in spectroscopic research and the study of atomic struc-

ture. Dr. Harrison joined the staff of the Institute's Department of Physics in 1930 to take charge of the newly opened spectroscopy laboratory. Under his leadership the laboratory has become an outstanding world center for the study of light as emitted by atoms and molecules.

Nearly ten years ago Dr. Harrison organized the international conferences on spectroscopy which have been held annually ever since, attracting scientists from all parts of the world. He has developed four ingenious new instruments which have greatly accelerated the Institute's program of spectroscopic research and have added notably to studies in this field wherever they are carried on. One machine measures and computes the wavelengths of spectrum lines; another, known as an interval sorter, determines the energy of atoms and molecules from their spectrum lines and is capable of making 50,000 subtractions a minute. This machine made possible the compilation of the M.I.T. Wavelength Tables, an encyclopedic work in which unskilled W.P.A. clerical workers were able to make precise measurements which previously were made only by highly trained experts. Through the development of such instruments, Dr. Harrison has provided modern physics with tools of enormous value for the investigation of scientific problems of fundamental importance. For his achievements in this field he was awarded the distinguished Rumford Medal in 1939.

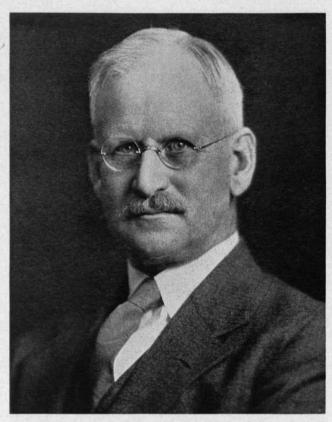
Dr. Harrison was born in San Diego, Calif., on July 14, 1898, the son of Ernest and Magda Harrison. He was educated in the public schools of Oceano and the Arroyo Grande High School in California and was graduated from Stanford University with the degree of bachelor of arts in 1919. In the same year, he was appointed instructor in physics at the university and continued in that position until 1923, when he was named a national research fellow in physics at Harvard. He was awarded the degree of master of arts at Stanford in 1920 and the degree of doctor of philosophy in 1922. After two years of research in the East, Dr. Harrison was appointed assistant professor of physics at Stanford and in 1927 became associate professor.

He is the author of a book entitled Atoms in Action, a popular interpretation of modern physics which was published in 1939 and has since been translated into eight languages. A simplified version of this book under the title, How Things Work, was recently published for children. Dr. Harrison is internationally known as the author of numerous scientific papers and is the editor of

the Journal of the Optical Society of America.

Much of Dr. Harrison's time for the past year has been given to his activities as chairman of the instruments section of the office of scientific research and development in the Office of Emergency Management. He is a member of the American Academy of Arts and Sciences, the American Astronomical Society, and Sigma Xi; a fellow of the American Physical Society; a director of the Optical Society of America; and a member of the board of governors of the American Institute of Physics. With his wife, two daughters, and a son, Professor Harrison lives in Belmont, Mass.

Dr. Prescott, who has been head of the Department of Biology and Public Health since 1922, was the first dean of the School of Science. He was appointed to that

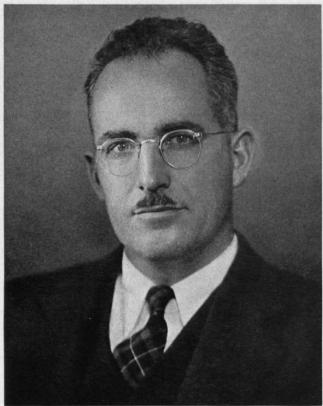


SAMUEL C. PRESCOTT, '94 Retiring Dean of Science

post in 1932, when Technology was subdivided into the Schools of Science, Engineering, and Architecture and the Divisions of Humanities and Industrial Cooperation. As head of the Department of Biology and Public Health, he succeeded William T. Sedgwick, who became head in 1907; he has contributed notably to the science of food production and preservation. Before the first World War, Dr. Prescott was sent to Central America by the United Fruit Company to study a disease which was then spreading through the banana plantations of Costa Rica. There he made the first serum inoculation tests performed on plants. Subsequent research confirmed the existence of the Panama disease in bananas, which was conquered by proper nutrition of the plants.

Since the World War, Dr. Prescott has been interested in researches on the technical aspects of such branches of the food industry as food preservation, domestic refrigeration, and the formation of commercial solvents by fermentation. Through his work in this field the program in food technology was established at the Institute.

Born in South Hampton, N. H., Dr. Prescott studied at Sanborn Seminary before entering Technology. He began his teaching career at the Institute under the distinguished leadership of Professor Sedgwick, and in 1900 Dr. Prescott spent several months in postgraduate work in Berlin, where he studied the fermentation processes, and at Copenhagen, where he worked under the eminent Danish bacteriologist, Jörgensen. Dr. Prescott then returned to Technology and was appointed an assistant professor in 1903. He was promoted to the rank of associate professor in 1909 and full pro-



(C) Bachrach

GEORGE R. HARRISON Named Dean of the School of Science

fessor in 1914. Under his leadership the first American course in industrial biology was established at Technology.

During the World War, Dean Prescott, serving as a major in the Sanitary Corps of the United States Army, was in charge of food research and the problems of storage at the great army training camps. His work included the development and specifications for dehydrated foods sent to troops abroad. As an outgrowth of these investigations, he was appointed chief of the division of dehydration of the Bureau of Chemistry in Washington. During the present war he is serving as special consultant to the Quartermaster Corps, United States Army.

Dr. Prescott is a fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences, and a member of the American Chemical Society, the American Society of Naturalists, the Society of Chemical Industry, the Institut International du Froid, and the Lambda Chi Alpha Fraternity. He is a member and past president of the Society of American Bacteriologists, the Technology chapter of Sigma Xi, and the Alumni Association of the M.I.T.; a fellow and past president of the American Public Health Association. His club membership includes the University Club of Boston, the New England Botanical Club, and the Harvard Travellers.

Translations by Dr. Prescott of Effront's Enzymes and Their Application and Biochemical Catalysts in Life and Industry; Proteolytic Enzymes have done much to make available to American workers European developments in this field. He is a co-author of a revision of

Professor Sedgwick's Principles of Sanitary Science and Public Health, and also joint author of Elements of Water Bacteriology with Special Reference to Sanitary Water Analysis, Science and Experiment as Applied to Canning, and Food Technology as well as of a more recent book, Industrial Microbiology. Dr. Prescott has been an associate editor of Food Research since 1936. He is a contributor to the "American Cyclopaedia of Agriculture" and to technical journals on bacteriology, food technology, and industrial biology.

Corporation Election

THE election of Willard H. Dow, President and general manager of the Dow Chemical Company, to special term membership on the Institute Corporation for five years was announced by President Compton

on January 7.

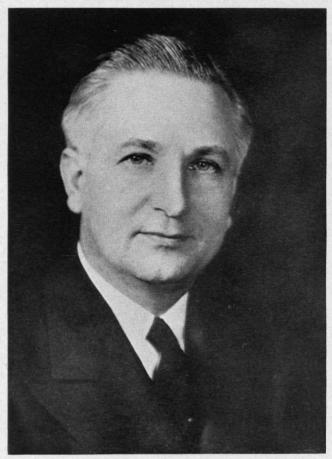
Dr. Dow, who is forty-five years old, was graduated from the University of Michigan in 1919 and was awarded his doctorate in science by the Michigan College of Mining and Technology in 1939. He joined the staff of his company as a chemical engineer in 1919 and has been a director since 1922. He was appointed assistant general manager in 1926 and became president and general manager in 1930. He is also president of the Ethyl-Dow Chemical Company and of the Midland Ammonia Company.

A member of the advisory board of the Chicago chemical procurement district of the Chemical Warfare Service, United States Army, Dr. Dow is also a member of the American Chemical Society, the American Institute of Chemical Engineers, the Newcomen Society, and the Deutsche Chemische Gesellschaft. His fraternities are Theta Delta Chi and Alpha Chi Sigma.

New Goals

THE Corporation has authorized changes in the In-▲ stitute's program in biology and public health which will concentrate research and instruction in fields more closely related to Technology's over-all program and will permit a more vigorous development of biology, biological engineering, and food technology. Under the new plan, present Courses leading to degrees in Public Health will be discontinued by June 30, 1944.

The Visiting Committee on the Department recently reviewed the status of public health instruction at the Institute in the light of a careful study, undertaken by the administration, of trends in public health instruction and professional requirements in this country. As a result of this review, the Committee concluded that in the future the Institute's most effective contribution to public health can be made in the fields of food technology and biological engineering and that the training of public health officers and professional workers can best be carried on in an educational environment which encompasses a school of medicine and other allied services. This conclusion recognizes the increasing importance of medicine in the public health field, the spreading requirement that public health officers hold medical degrees, and the inordinate expenditure of funds which would be required if the Institute were to expand



WILLARD H. DOW Special term member of the Corporation

its public health program to meet these conditions. Since the Institute does provide an ideal environment for food technology and for quantitative biology, biophysics, biochemistry, and biotechnology, which are included in biological engineering, the Committee recommended that available funds be devoted to the continued vigorous development of these activities.

The Committee has recommended, and the Corporation has approved, that the awarding of degrees and certificates in public health, but not of degrees in public health engineering, be discontinued after June 30, 1944, and that undergraduate and graduate students be admitted in the professional fields of public health, public health administration, or public health education only as they may reasonably be expected to qualify for a degree or certificate before June 30, 1944. Students at present enrolled in these fields will thus be enabled to complete their programs.

The Institute's Department of Biology and Public Health, which will become the Department of Biology and Biological Engineering on July 1, 1942, has had a very distinguished history both in the quality of men who have been graduated from it and in its contributions to the development of public health science and to applied biology. William T. Sedgwick, who headed the Department from 1907 until his death in 1921, was the unquestioned leader in the beginnings of public health activity in the United States. Under his direction, by timely emphasis on the bacteriological and sanitary aspects of environmental problems such as gas poisoning, water supply, filtration, sewage, municipal sanitation, tuberculosis, milk supply, and health education, the Department pioneered in the promotion of public health as an art and a profession. In 1913 the Institute's program in public health, which had constituted the first comprehensive school of public health in this country, was allied with public health work at Harvard to form a school for health officers carried on jointly by the two institutions, and this arrangement continued for nine years.

Under Samuel C. Prescott, '94, who became head in 1922 and retires next June, the Department has had its greatest period of growth and has continued to take the lead in new developments in its field. Under his administration health education has been developed as a special subject, the Course in Public Health Engineering established, the Course in Biophysics and Biological Engineering introduced, and the present flourishing work in food technology initiated. Two years ago the Rockefeller Foundation made a grant of \$200,000 to develop the program in biological engineering, and last June the foundation appropriated an additional \$70,000 to set up a Sub-Microscope Center.

In accordance with the action taken by the Corporation, the Department of Biology and Biological Engineering, beginning on July 1, 1942, will concentrate on food technology, biological engineering, and allied fields, and until their discontinuance on June 30, 1944, the programs in public health will be administered separately, along with the continuing Course in Public Health Engineering. Although formal programs leading to a degree in public health will be discontinued in 1944, the Institute is expected to continue to offer, if there is a demand, appropriate elective and general study subjects relating to public health.

Head of the new Department will be Francis O. Schmitt, Professor of Biology, who joined the Institute's staff in 1941. Until the program is discontinued, the section in public health will be administered by Clair E. Turner, '17, Professor of Biology and Public Health, who has been a member of the staff since 1914.

Transatlantic Award

WILLIAM D. COOLIDGE, '96, Vice-President of the General Electric Company in charge of research and director of the General Electric research laboratory at Schenectady, has been awarded the Duddell Medal of the Physical Society in London. The medal, first conferred in 1924, was established to commemorate the work of William Du Bois Duddell, a distinguished English physicist and electrical engineer who died in 1917 while working on war problems. The medal is awarded "to persons who have contributed to the advancement of knowledge by the invention or design of scientific instruments or by the discovery of materials used in their construction."

In announcing the honor, Sir Owen Richardson, Foreign Secretary of the Physical Society, said that the award was made in recognition of Dr. Coolidge's achievements "in producing ductile tungsten from the powdered metal, and the development about 1913 of the



WILLIAM D. COOLIDGE, '96

Duddell medalist

heated-filament-cathode x-ray tube." Dr. Coolidge, it will be recalled, has served as a term member on the Institute's Corporation and on the staff of the Departments of Physics and Chemistry.

Visiting Committee Report

DEPARTMENT OF ECONOMICS AND SOCIAL SCIENCE *

THE Committee, meeting on January 8, 1941, dis-L cussed the then proposed program of graduate study leading to the degree of doctor of philosophy in industrial economics. The program was described in detail in The Review for March and went into effect last fall. Impressed with the efficiency and enthusiasm of the staff, the Committee found that the general teaching work of the Department was being developed by the use of improved methods, by the addition of competent instructors, and by the expansion of the program. In order to improve the course in economic principles, experiments were conducted, with satisfactory results, in the employment of cases as a teaching aid and in the use, as a textbook, of the report, "The Structure of the American Economy," prepared under the direction of the industrial section of the National Resources Com-

Expansion of the teaching program was made possible through the co-operation of the Departments of Mathematics and Chemical Engineering. New courses in statistics were added as required (Concluded on page 198)

*The members of this Committee for 1940–1941 were Victor M. Cutter, Chairman, Max L. Waterman, '13, William J. Barrett, '16, Raymond H. Blanchard, '17, Charles R. Hook, Carlton Richmond, and Albert H. Wiggin.

BEFORE FULTON

(Continued from page 171)

tried on a Thames coal barge, which it propelled by mechanically operated oars or paddles. The *British Magazine and Review* of October 26, 1783, reported: "It seems rather too complex a business in its present state, but the plan appears practicable, and should it succeed by some judicious constructing, it must prove of im-

mense advantage to the trade."

After the interruption of De Jouffroy's work by the French Revolution and the partially successful experiment of 1783 on the Thames, the scene of our review of the work of pioneer steamboat builders shifts to that part of Virginia which is now West Virginia, where James Rumsey of Berkeley County exhibited a small experimental steamer to a company of visitors at Berkeley Springs in 1784. The boat was apparently driven by a jet propeller, the power plant consisting of a steam pump which drew water in at the bow and expelled it at the stern. George Washington was among those who witnessed the experiment, and the practicability of the invention so impressed him that he gave Rumsey a certificate reading: "I have seen the model of Mr. Rumsey's boat, constructed to work against the stream: examined the powers upon which it acts; been eye-witness to an actual experiment in running waters of some rapidity; and give it as my opinion (although I had little faith before) that he has discovered the art of working boats by mechanism and small manual assistance against rapid currents; that the discovery is of vast importance, may be of the greatest usefulness in our inland navigation; and if it succeeds, of which I have no doubt, the value of it is greatly enhanced by the simplicity of the work, which, when explained, may be executed by the most common mechanic. Given under my hand and seal, in the town of Bath, county of Berkeley, in the State of Virginia, this 7th day of September, 1784. George Washington."

Rumsey made further demonstration of jet-propelled steamboats in 1785 and 1787. The second of these boats was tried on the Potomac at Shephardstown, Va., on December 3, 1787, and it moved at the rate of four miles an hour. The jet propeller has been revived many times since Rumsey's day and has never proved efficient or practical for general use. Rumsey's experiments apparently could not have led to a very successful conclusion had he stuck to jet propulsion. He died in England, having gone there in 1788 to promote the construction of a steamboat, which was completed and tried on the Thames after his death. Like his last American vessel, it made a speed of about four miles an

hour.

Rumsey's most important contributions to the development of practical steam navigation were probably to demonstrate to skeptics that a vessel could be moved by steam power and to stimulate the interest of others, particularly of John Fitch, John Stevens, and Robert Fulton. Rumsey and Fitch became involved in a bitter controversy over the originality of their ideas for steamboats, after Fitch presented plans for the construction of such a vessel to the American Philosophical Society of Philadelphia on September 27, 1785; Colonel

Stevens corresponded with Rumsey on steamboats in 1788; and Fulton met him in England and discussed at some length the feasibility of steam navigation.

After presenting to the Philosophical Society his plans for a steamboat, Fitch petitioned the legislature of Virginia for assistance in the construction of such a vessel, and believing that the boat could be built readily and cheaply, executed a bond to Governor Patrick Henry. Fitch agreed that if he should sell a thousand copies of his proposed map of the western country, with which he had become familiar while a surveyor in Kentucky and while held captive in Detroit and Montreal by Indians, he would nine months thereafter exhibit a steamboat on the waters of Virginia or forfeit a penalty of £350.

The sale of the maps was disappointingly small, and the steamer was never built in Virginia. Fitch then tried to induce the legislatures of Maryland, Pennsylvania, and New Jersey to appropriate money for the construction of a steamboat, but he met with no success other than that New Jersey granted him a fourteen-year monopoly for the manufacture and operation of vessels propelled by fire or steam on the waters of the state. He finally secured financial assistance in Philadelphia, and there he and his associates built several steamers.

A model steam engine was first built with a cylinder of one-inch diameter. This model worked but was considered too small to prove anything; so a larger engine of three-inch bore was constructed and installed in a skiff. Spiral paddle-wheel propellers and endless chains with floats were first tried with this engine and proved unsatisfactory. Fitch then devised a method of connecting a series of vertical oars or paddles to his engine, which moved them with a stroke somewhat like that of a canoe paddle. In July, 1786, with this method of propulsion, the little boat made a number of successful trials, and Fitch and his associates set about building a steamer for practical use, After considerable difficulty in financing, a forty-five-foot boat was built and fitted with a single-cylinder horizontal engine of twelve-inch bore and thirty-six-inch stroke, which drove twelve vertical oars or paddles, six on each side of the boat. The engine was finished in May, 1787, but the wood cylinder-heads leaked, the piston packing was faulty, and something continually went wrong. Finally, however, the boat made three or four miles an hour and so impressed a group of local dignitaries at a demonstration given on August 22, 1787, that funds were secured for building a larger boat. This boat, completed in 1788 and called the Thornton, was sixty feet long, was somewhat narrower than Fitch's previous vessel, and was driven by "three or more side paddles at the stern." It made several trips to Burlington and carried as many as thirty people at a

The Thornton was followed in 1790 by Fitch's most successful boat. This, between April and September of that year, made some thirty sailings in commercial service on the Delaware to Trenton, Burlington, Chester, Wilmington, and Gray's Ferry. The boat apparently had no name; an advertisement for it in the Federal Gazette and Philadelphia Daily Advertiser of July 26, 1790, refers to it merely as "The Steamboat." During the summer of 1790 (Continued on page 188)

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BEFORE FULTON

(Continued from page 186)

this boat ran over two thousand miles and carried from nine hundred to a thousand passengers, but she did not pay and was laid up at the end of the season and never used again. It is a great pity that nothing reliable is known of her dimensions or of the details of her machinery. She must have been driven by something more practical than the mechanical oars or paddles of Fitch's earlier boats. My guess, and it is admittedly a guess, is that the boat had either side wheels or a stern wheel, and that a crank and connecting rod were used to convert the reciprocating motion of the piston to a rotary motion. By that time the crank and connecting rod were fairly well known.

In October, 1790, Fitch and his associates started to build another steamer, to be called Perseverance, but her engines were never completed and she was abandoned in 1792. He went to France in 1793 but made no real progress in obtaining backing for the development of his invention and returned to America, where, in New York City in 1796 on the Collect Pond, which lay south of Canal Street and has long since been filled in, he exhibited a ship's yawl driven by a beam engine turning a screw propeller. The boiler of this strange craft was a ten- or twelve-gallon iron pot with an oak cover, and the two single-acting vertical cylinders were built, like beer kegs, of wood staves with iron hoops. Piston rods led through the tops of the cylinders to a walking beam from which a connecting rod ran to the crank. Demonstrations appear to have been made with this engine driving a screw and, later, side wheels. Chancellor Robert R. Livingston undoubtedly made a trip around the pond in the boat, and according to a deposition made nineteen years later by John R. Hutchings, who assisted Fitch in running the boat, Robert Fulton was also aboard it with Livingston. The preponderance of evidence, however, points to Hutchings' being mistaken as to Fulton's presence, for according to general belief, he was abroad at the time.

After the Collect Pond experiment, Fitch went to Bardstown, Ky., where he built his last steamer, a small model. He died in poverty in 1798. In 1927 the country erected a national monument to Fitch in tardy recognition of the man who gave the world its first commercial steamer and who in his autobiography said: "The day will come when some more powerful man will get fame and riches from MY invention; but nobody will believe that poor John Fitch can do anything worthy of

attention.

While Fitch had been building his series of steamboats, and shortly after his death, other inventors in America and Europe were busy with the problem of steam navigation. An article of this length must omit much of their work, discussing only the most important historically - the two boats built by Patrick Millar and William Symington, Symington's Charlotte Dundas, and the boats built by Colonel John C. Stevens and his associates.

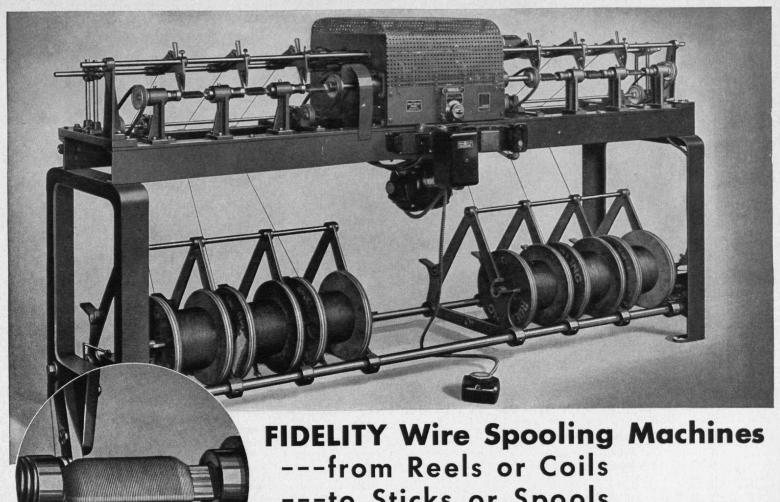
In 1788, Patrick Millar of Dalswinton, Scotland, experimented with man-turned paddle wheels to drive his pleasure boat, a twenty-five-foot catamaran, on

Dalswinton Loch. James Taylor, a tutor in the Millar family, suggested that a steam engine might turn the wheels better than men did, and Millar, accepting the suggestion, commissioned William Symington, a mechanic of great ingenuity, to build an engine for the boat. Symington's original two-cylinder single-acting engine, which drove two paddle wheels located between the hulls of the catamaran by means of chains and ratchets, is now (or was until the war started) on exhibition in the Science Museum, South Kensington. His engine drove the boat so well that a much larger boat, sixty feet long, also a catamaran, with a similar and larger engine developing twelve horsepower, was built and tried on the Forth and Clyde Canal in 1789, This boat made six and a half or seven miles an hour to the great gratification of its builder and owner, but apparently was not used for anything but experimental

and pleasure purposes.

Symington's third and last boat, the Charlotte Dundas, was, however, intended for practical use. She was built to the order of the Lord Dundas of Kerse for use as a tug on the Forth and Clyde Canal. In this vessel Symington used a modified double hull which gave free access of the water to the single stern wheel with which she was fitted and which was driven by a double-acting horizontal condensing steam engine of twenty-twoinch bore and forty-eight-inch stroke constructed by Boulton and Watt, who by that time had become world renowned builders of stationary engines. As a technical achievement in steamboat building, the Charlotte Dundas was a complete success. In one trial she towed two heavily loaded barges of upwards of seventy tons burden each a distance of nineteen and a half miles in six hours into the teeth of a high wind, against which other barges could not be moved. Running light, the tug could make a steady six miles an hour. Writing of this boat in 1841, Scott Russell said her performance appeared "to be about as great as any since accomplished by the many boats which on the same canal have attempted the same duty. So simple was the machinery that it might have been at work to this day with merely ordinary repairs." As a practical towboat for canal use, the Charlotte Dundas was, however, a failure. Her wash caused such damage to the canal banks that the owners withdrew her from service. Fulton, who was in England in 1802, heard of her and made a trip to Scotland to see the boat and to discuss her construction with Symington. To Fulton's gratification, Symington not only was willing to discuss steamboats but showed his guest the Charlotte Dundas and even went to the trouble of getting up steam in her power plant and taking Fulton for a short trip on the canal. Fulton's first trip on a steamboat that really ran was on the Charlotte Dundas and not on the Clermont. Before considering Fulton's famous vessel we must, however, recross the Atlantic to observe the progress made by one of his outstanding predeces-

The interest of Colonel John Stevens of Hoboken in steam navigation originated in his appreciation of the need of the country for improved methods of transportation. Stevens had no technical or engineering training, his education having been in the legal profession. He became interested in Rumsey's (Continued on page 190)

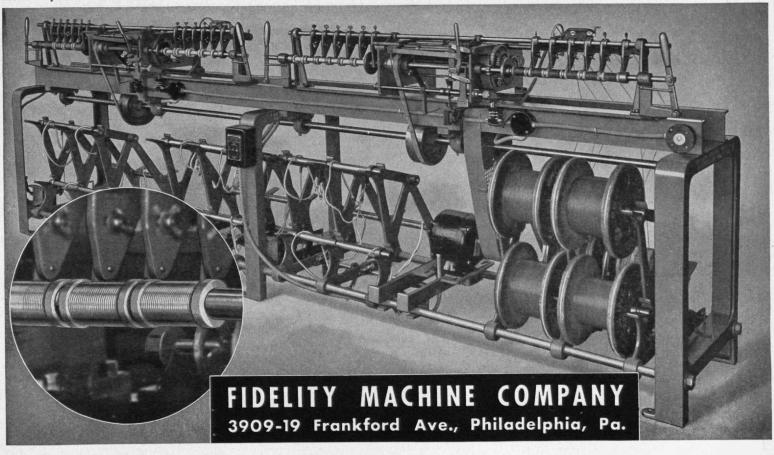


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BEFORE FULTON

(Continued from page 188)

work, however, and in 1791 began to plan the study of steam vessels. He followed the experiments of other men very closely and undoubtedly saw the steamer which Samuel Morey ran from Hartford to New York in 1794 and knew of the experiments of Fitch on Collect Pond. Later he became associated with his brother-in-law, Chancellor Robert Livingston, and with Nicholas Roosevelt in the construction of experimental steam vessels.

Stevens' first experiments were failures, but in 1798 or 1799 a boat built jointly by Stevens, Livingston, and Roosevelt was tried on the Passaic River and ran to New York and back. The Spanish minister to the United States, the Marquess d'Yrujo, who was a passenger, estimated the speed of the boat at five miles an hour, but Stevens and Roosevelt claimed only three and a half. The method of propulsion is not clear, but the boat was probably a stern-wheeler. In these experiments the three associates were assisted by Marc Isambard Brunel, an engineer refugee from the French Revolution, who later attained great prominence in England and whose son I. K. Brunel became one of the outstanding engineers of all time. The experiments of Livingston, Stevens, and Roosevelt might have had a much more encouraging outcome had Roosevelt been able to convince his associates that the side wheel was the most practical device then available for driving a boat. In 1801 Livingston was appointed minister to France, and Stevens went on alone with his experiments. After an unsuccessful attempt, made in 1802, to drive a single-screw steam launch with a rotary engine of his own design, Stevens and his sons John Cox and Robert Livingston Stevens, built and successfully operated the Little Juliana in 1804. This boat was a small twin-screw steam launch driven by a vertical double-acting noncondensing engine, four-and-a-half-inch bore and nine-inch stroke, built in Stevens' own shop. Steam was furnished by a water-tube boiler of the porcupine type. With this power plant, the Little Juliana made at least one trip to New York. A somewhat larger boat with the same type of machinery was built a couple of years later, but Stevens' ideas were fully fifty years ahead of the development of engine-building and boiler-making technique which would later make them practicable. Trouble with the high-pressure power plants of these boats forced him to abandon the high-pressure engine, water-tube boiler, and screw propeller in favor of a low-pressure engine and side wheels when he built the successful Phoenix, which came out just after Fulton put the Clermont into service.

Fulton was an artist of some ability and as an engineer was unquestionably a man of skill, ingenuity, and daring. His interest in steam navigation was of long standing when he finally determined to attempt the construction of a steamer. An experimental steamer built in France, where he formed a partnership with Chancellor Robert Livingston, to run between New York and Albany was unsuccessful, but trials made in 1804 gave the partners some encouragement. From the experience gained with this vessel, (Concluded on page 192)



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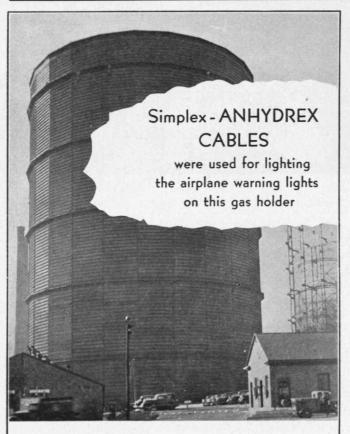
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BEFORE FULTON

(Concluded from page 190)

and after inspecting Symington's Charlotte Dundas, he became convinced that a commercially successful steamer could be produced by combining the Watt lowpressure condensing steam engine and the time-tested paddle wheel. After some considerable difficulty he secured the essential parts of an engine — the cylinder with its working parts, condenser, air pump, and so on - from the firm of Boulton and Watt and a copper boiler from a firm experienced in boiler construction. He mounted boiler and engine in a long, narrow hull resembling a canal boat and connected the piston rod of his Watt engine to the paddle shaft of the boat by an ingenious system of links, levers, and connecting rods of his own devising. The result was the Clermont. Had Fulton attempted to build his own power plant, his vessel would in all probability have been just another experimental steamboat, but by going to engine builders of experience he produced the first commercially successful steamer in the world, a triumph of conservatism and common sense over mere mechanical ingenuity.

WORK FOR WOMEN

(Continued from page 174)

children. As these figures are computed on the basis that no woman has more than one child within each quinquennium, the percentages given fall short in presenting the proportion of women bearing no children within each age group. Observe that women having no children constitute in no age group less than 58.0 per cent.

Women's wages are customarily not more than 60 per cent of those paid to men for similar work. That they should be lower is no doubt due to the limited amount of work open to women and to the large number of women who are either actual or potential competitors for that work. The exaggerated in-and-out movement to and from industry among women weakens their resistance to low wages. Because men have more continuity of employment and are diffused over a much larger sector of the employment structure, they are able to build up both a more solid and a more stable wage structure. Something nearer parity between male and female wages would add substantial sums to pay rolls of nearly every city.

The large number of unemployed but employable women constitutes a huge reserve of potential but at present unutilized workers. We have become so accustomed to seeing women restricted to the home as not to sense that continuance of this policy under the changed conditions of today (Concluded on page 194)





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WORK FOR WOMEN

(Concluded from page 192)

really disguises a considerable volume of virtual unemployment. Even if the total over-all employment of females in cities like Gary and Youngstown should increase 100 per cent, proportionately no more women would be employed in those cities than is now true in such communities as Albany and Hartford.

In manufacturing itself, we find that the employment of women could be increased 100 per cent in a city like Des Moines, 200 per cent in Scranton, 300 per cent in Detroit, and 400 per cent in Canton without in the aggregate employing a greater proportion of the total women in the community than is now done in such cities as Fall River and Providence. With factory wages for many grades of skill equal to, and even in excess of, those paid for store and office work, the class consciousness and prejudice against the industrial employment of women should in time disappear. Their entrance into industry should raise standards of living for both themselves and their families. For their respective communities, the added pay rolls would be equivalent to the discovery of a great hidden resource.

The prohibition of nightwork for women, by making impossible the operation of a third shift made up either wholly or partly of women, may in some instances either displace or prevent the employment of women in industry. To that extent social legislation may substitute men for women. Regional advantages accruing to industry as a result of state laws regulating employment of labor tend to diminish in importance with the adoption of national legislation. In time it would not be surprising if the national standard established in such respects will be made so effective as appreciably to reduce the amount of state control. Then regional differentials arising out of variations in state laws will become less and less significant in determining the location of industry.

Rarely do women directly displace men in industry. Conditions usually develop in a manner to make employment of females preferable to that of males. Thus, in order to obtain a more rapid production, the emphasis in some industries has shifted in recent years from machines requiring hand operations to machines necessitating finger manipulation. This trend toward small motions and simpler operations has made much work heretofore open only to men available to women. Particularly in fine assembly work do the demands for finger dexterity make women, with their nimble fingers and lightninglike speed, far more productive than men, with their clumsy fingers.

From 40 to 50 per cent of employed women either are or have been married. Well over half of the single women live with one parent or both parents. Many single women are the sole support of their families. The proportion of families with a woman worker increases directly with the size of the family. From one-sixth to one-fifth of the households with wage-earning women possess no male wage earner.

Female employment is usually a by-product of male employment. Although the concentration of manufacturing establishments employing female workers is dis-

tinctly limited at any one point, this fact does not imply that only one-half or three-fourths of this valuable asset should be used. True, the employment of more than the approximate quota of potentially available women in a city can generally not be effected except at such a wage level as will attract women to the area through immigration from other places, thus increasing the unit costs of manufacture. It may be that a region where more than 25 per cent of the total number of women are employed no matter what the types of gainful pursuits fully utilized its supply of female workers and has reached the limit in development of industries dependent upon employment of local women. But these conclusions seem doubtful. Probably from 40 to 50 per cent of all women in a locality are employable under appropriate conditions. Heretofore when more than 25 per cent of the female population has been employed, industry has deemed that source of personnel fully used and has, in order to keep down labor costs, developed new plants in regions not so intensively exploited with female industries. Careful study might well show that by paying a little more in wages or by effecting an improvement in working conditions, a higher grade of help would be attracted, thus permitting local expansions of plant without increase in the unit costs of the product.

The employment of women in business and industry has further implications than merely so many girls at work: It leaves its impress upon both work and worker. In the long run, women have as much to contribute to business as have men. The more women seek employment, even if merely in their earlier years, the better they will understand how to manage business relations and the outside contacts of themselves and their families in later life. And then there is the impact of business upon the character of the worker herself. Who would deny that the average woman who has worked is a more self-reliant and understanding individual than her sister who has always remained cloistered in the home or in school? Cultivation of these personal values presages the development of a still greater social asset, for in our national emergency the women with experience in business and industry will contribute more than their fair share to the solution of the dilemma confronting the country. In the words of Brigadier General Lewis B. Hershey, "The Selective Service System will expect a gradual but constant substitution of women for men who are fit to fight."

THE NAVAHOS IN THE MACHINE AGE

(Continued from page 180)

Navaho cuisine shows little white influence. In all likelihood mutton, goat, and beef are prepared in the fashion formerly used for venison. The taste for coffee and tea was acquired during the Fort Sumner period, and coffee is today an indispensable part of every meal. The use of mealed wheat flour also dates from that time and has gradually supplanted hand-ground corn flour. Despite the fact that salt can be bought at every trading store, many Navahos still make long journeys to various "sacred" salt deposits. Although this procedure is often more expensive than buying salt at the store, the aboriginal habit persists, partly because of established preference for the taste of the salt from the natural deposits, partly because salt-gathering is a highly ritualized activity.

Pottery and basketry are today made exclusively for ceremonial purposes, and the Navahos are relying more and more on the pottery and basketry produced by other Indian tribes. The making of pottery (at least of painted pottery in a variety of shapes) appears to have become well established only a century or two ago. Through the impact of European material culture, the craft apparently grew obsolete while yet in the process of adjustment. When unbreakable metal vessels became available at not very high prices, it was no longer worth while to make pottery. The utilitarian need for baskets was similarly extinguished, and when baskets and pots came to have only ceremonial uses, both crafts became surrounded with so many ritual restrictions that most women were either afraid to undertake the manufacture of them or were simply unwilling to go to all the bother. In Tschopik's words, ". . . We appear to be dealing with a peculiar phenomenon; namely, that crafts, surviving today solely in ritual context, have declined to the point of extinction principally . . . because they do survive solely in a ritual context.'

Most containers, then, are at present derived from our culture. Every Navaho house contains pots and pans, cloth sacks, and trunks or suitcases in which ornaments and family treasures are stored. Likewise, store axes and a few other metal tools are normally found. Indeed, apart from lariats and hobbles of rawhide, infrequent bows and arrows, rocks for grinding corn and medicines, and a few crude handmade objects such as troughs hollowed out of logs, almost all implements are now of white manufacture. The principal exceptions are ceremonial articles. The houses of ceremonial practitioners (about one adult man in every four or five practices some sort of ritual for pay) contain buckskin pouches for keeping ritual equipment, wooden composite fire drills for kindling ceremonial

fires, and other archaic objects.

Log cabins based on white prototypes are now common in the regions closest to railroads. In the main, however, the native type of house and lean-to still prevails, for a variety of reasons: In the first place, greater imitation of European examples would be expensive in materials, and the natives lack carpentry skills. In the second place, the hogan is an excellent simple adaptation to the climate. I have found hogans generally more comfortable than the cabins of white homesteaders. In the third place, religious rites cannot be carried on except in a native type of house. Few Navahos have abandoned their religion, so that practically everyone who lives in a white-style cabin must also have a hogan.

Costume, perhaps more than any other part of the culture, reflects the historical experience of the Navahos. Thorough study reveals successive contacts with Great Basin, Plains, and Pueblo Indians, and with the Spanish and "Americans." By and large, the present dress of the men is a colorful variation on the cowboy theme, and the calico and velveteen blouses and the full, fluted calico skirts of the women reflect the fashions worn by the wives of American army (Continued on page 196)

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THE NAVAHOS IN THE MACHINE AGE

(Continued from page 195)

officers in the late 1860's. The hairdress of women and that of conservative men are adapted from the Pueblos. The shirts and trousers of some older men also show Puebloan (and ultimately Spanish) influence. Virtually the only feature which looks definitely aboriginal is the cowhide moccasin (one still sees buckskin now and then). Almost all Navahos wear moccasins at least part of the

Horseback travel by trail and wagon road is still the staple form of transportation. The Navaho country is perhaps the only part of the United States where one may see great numbers of farm wagons, including covered wagons. Buggies are seen now and then. The oldest type of Navaho saddle was made of two hide cylinders stuffed with hair and attached by wide strips. It was placed on the horse's back and secured by a girth. Now, however, the land of the Navaho is one of the best places to see cowpuncher saddles in their old luxuriance and variety.

Fifteen years ago, Navaho-owned automobiles were rarities. Today, perhaps one family out of every twentyfive or thirty owns a car. Very few are bought new, and hence Gallup, N. M., and Flagstaff, Ariz., are perhaps the best small-town jaloppy marts in America. It is my impression that Navahos, as compared with Hopi Indians, for example, make poor automobile mechanics. But the Navahos are good natured, patient, and persistent in tinkering with broken-down machines; by sheer trial-and-error methods some are able to keep very ancient models in circulation. The dominant pattern, though, is that of supreme neglect of such necessities as greasing and battery water.

Most persons, if they know nothing else about the Navahos, realize that they make rugs. At first, their textiles were made as wearing apparel, but by 1890 they were producing mainly a coarse rug for commerce. Although several revivals of old designs and of vegetable dyes have occurred since then, the product remains commercial. The Navahos wear Pendleton blankets made in Oregon, which serve, together with sheep and

goat pelts, for bedding. The only use which the Navahos make of the textiles that they themselves produce is as

Experimentation in weaving has been limited almost exclusively to design. Pueblo Indians never departed from their original simple, banded patterns. The Navahos' lack of conservatism, their lively imagination, and their splendid sense of humor are shown in the riotous colors and elaborate patterns which they have produced.

A Navaho family, however, makes all the tools the weaver needs, save for her tow cards. This fact is to be traced in part, I think, to the relative conservatism of the women. At any rate, the same thing is far from true of the other great Navaho craft, silversmithing. The smiths, who are mostly men, obtain both tools and materials entirely from white traders. It is true that silver mining could hardly be expected, but the forging of their own tools would be quite possible. Here again the creativeness of Navahos is as artists - in making new designs for stamp dies or for casting, in evolving new forms and arrangements.

The Navahos market one other commodity: pinyon nuts. There is normally an important harvest of these but every four or five years. Pinyon nuts are gathered by whole families in aboriginal fashion. The only European device utilized is wire screening to separate the nuts from other materials picked up from the ground or taken from pack-rat nests. In 1936 one small trading store paid out \$18,000 to gatherers. The market for the nuts is, of course, a function of the technological matrix by which this rather primitive culture is now surrounded.

For all practical purposes the applications of electricity, probably the most conspicuous feature of our machine culture, have not impinged on the Navahos at all. But it must be remembered that throughout New Mexico and Arizona only the few towns of any size have power plants, and extensive areas have no telephone or telegraph communication. One application of electricity — the radio — may well have a fairly wide distribution among the Navahos before too long. Within the last few years the Office of Indian Affairs has installed broadcasting units at twenty or more localities

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to insure communication when roads are impassable and snow and ice make the telephones uncertain. The stations are used primarily to enable the Navaho Central Agency to transmit instructions and receive reports. Already some broadcasts are in the native language, and Indian Service representatives are encouraging the purchase of receiving units by families who can afford them. In the last decade Navaho children who have attended government boarding schools have become familiar with radios and often quite devoted to certain programs, notably cowboy music. If this interest can be transferred to programs in the native language, one of the most recent developments of our technology may quite possibly become a tremendous force in preserving a sense of unity among a primitive people!

What generalizations can we draw from this hasty survey? First, we note that the bulk of Navaho material culture now shows European derivation or influence, and that their nonmaterial culture as yet does not. This finding is in full accord with the general anthropological induction that the nonmaterial culture of a people is much the more resistant to change. A second anthropological theorem which receives further confirmation is that those aspects of material culture which have persisted at about the aboriginal level tend strongly to be associated with ritual activity. A final generalization which also seems to be widely true, at least in nonliterate societies, is that women are more conservative than men: Food preparation, women's costume, women's commercial craft - in all of these we notice more preservation of ancient patterns. The really astonishing thing, as one experiences the totality of Navaho life today, is the degree to which these Indians have taken over aspects of our technology without sensible alteration to the distinctive flavor of their own way of life. Most Indian groups who have so fully accepted European material culture have strongly tended to become a rather degraded sort of poor white. The Navahos are characterized, on the one hand, by their lack of emotional resistance to learning new techniques and using foreign tools, and, on the other, by their ability for making alien ideas congruent with a pre-existent design for living.

The significance of these facts is not exhausted by the extent to which they satisfy a harmless but idle intellectual curiosity. Whatever escapist or romantic motiva-

tions may drive persons to study nonliterate societies, a view of our own culture from the anthropological angle has certain tough-minded advantages. To do what the physical and biological scientist has done in the laboratory, the social scientist must turn to the variety of human societies, and especially to the simpler and more homogeneous societies. By scrupulous comparison he can hope to factor out the variables which are approximately constant and isolate those which seem to be determinative of the particular behavior in question. Simple induction and employment of the method of agreement and difference must, for the most part, take in his work the place of the technique of the crucial experiment.

The United States, because of the paradoxical juxtaposition of paleotechnic and neotechnic cultures to which I have alluded in the beginning of this article, constitute a peculiarly satisfactory "laboratory" for the comparative study of cultures. And, if I may be pardoned this apologia for my own profession, the study of the Navahos or of any other nonliterate group is never an end in itself. Such investigation is justified only in so far as the results throw light upon the problems of our own society.

MACHINES TO BUILD MACHINES

(Concluded from page 177)

were used at least as early as 1750. Today the milling machine has almost supplanted the planer for machining flat surfaces, but its original purpose was the production of irregularly curved surfaces. Although used for special purposes for many years, the modern type of milling machine developed very slowly. The use of it increased noticeably during the Civil War, but it was not generally accepted as a production machine until about 1890.

Wars have always stimulated machine-tool building. The cannon-boring machine was the first machine tool. There is no doubt we had more machine shops in 1785 than we did in 1775. The era of modern machine-tool building in this country began in 1861. Grinding machines, automatic screw machines, turret lathes, and milling machines were subsequent developments. High-speed steel and the demands of the automotive industries have been responsible for later improvements.

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THE INSTITUTE GAZETTE

(Concluded from page 185)

by the statistics option set up by the Department of Mathematics. New courses in economic principles and industrial relations were added to satisfy the enlarged economics program now being offered to a selected group of chemical engineering students. A significant breaking down of departmental barriers is the result.

The statisticians of the Department have been active not only in connection with its expanded teaching program but also in meeting demands upon their time and energy arising from problems presented by research workers in other Departments of the Institute and by industrial concerns. During 1940, more than thirty concerns submitted statistical problems for solution, and some of these questions required visits to the plants. Since 1939, in co-operation with the Department of Mathematics, a summer course in industrial statistics has been offered to young business executives. About fifteen enrolled in each of these courses, and the results have been valuable not only to the concerns represented but also to the Department. The scope of the Department's industrial contacts has thus been enlarged.

The Industrial Relations Section continues to develop. Its library is used increasingly by students as well as by industry and the public. The library issues to a limited group of industrial concerns a series of bulletins dealing with company practices with respect to current employer-employee problems. Several research studies have been completed; others are being carried on.

The defense emergency has affected the work of the Department in various ways. Lectures dealing with the economic problems of industrial mobilization are being given in the general course in economics which is required of all students. A special general study, the economics of war, was offered during the first term of the year 1940–1941. Members of the Industrial Relations Section have co-operated with various branches of the Federal Government: (1) in making a study of skilled labor shortages in the aviation and machine-tool industries, (2) in a survey of the labor market in New England, (3) in consulting with the National Resources Planning Board on problems of industrial location, and (4) in contributing to the training-within-industry program of the National Defense Advisory Commission.

National Nutrition

ESTABLISHMENT of the Nutrition Foundation, of which Dr. Compton is chairman of the board of trustees, was announced in New York recently. The purpose of the foundation, which is supported by a group of leading manufacturers in the food industry and allied fields, is to improve the food, diet, and health of the American people and their allies. The new foundation, which will operate on a nonprofit basis, will co-operate closely with existing agencies of the government, institutions, and societies which are likewise working on various aspects of nutrition. Its aim will be to help and to supplement the efforts of these agencies.

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TECHNOLOGY MEN IN ACTION

The Alumni Fund — Its Problems and Growth
Alumni and Officers in the News
News from Clubs and Classes

FEBRUARY, 1942

TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND-ITS PROBLEMS AND GROWTH

A STATEMENT FROM THE CHAIRMAN OF THE

M.I.T. ALUMNI FUND BOARD

Since I last addressed the alumni body, our country has gone to war. This action has brought immediate changes to the life of every one of us. Other and more far-reaching changes will follow. At such a time, financial readjustments must inevitably be made. Increased taxes and higher living costs will reduce the amount which we normally set aside for charitable purposes. At the same time, the demands of those organizations which amply merit our support are increasing. Where, in this changing picture, does the M.I.T. Alumni Fund stand?

May I remind you again of the basic purpose of the Fund — to be of material assistance to Technology's financial future. I do not need to tell you how closely interwoven are the futures of our alma mater and our country. State, nation, and industry, depending in ever greater degree during the last half-century upon the product of M.I.T.'s classrooms and laboratories, are showing now how great that dependency has become. Not until the history is written shall we appreciate the full extent of the Institute's contributions to the winning of the war. The fact is assured that in the brighter days ahead those contributions will not be forgotten, that M.I.T. will be called upon as never before to play an increasingly important role in service to our nation.

Technology is a strong institution — strong in every department. To be in a position to accept increased responsibilities, it must increase that strength. The function of the Alumni Fund is to aid in strengthening Technology's financial structure. This function is not something for the future alone, for if we neglect it today the future will find us unprepared, unable to aid the Institute in accepting the opportunities which will be presented to it.

In re-aligning your financial affairs, consider well these facts. The M.I.T. Alumni Fund will undoubtedly stand high among the opportunities which are presented to you for sound investment in the future.

H. B. RICHMOND

ALUMNI AND OFFICERS IN THE NEWS

Honor

I To Norman L. Bowen'12, by the presentation of the Penrose Medal by the Geological Society of America, Boston, December 30. The medal was awarded Dr. Bowen, the youngest scientist ever to receive the honor, in recognition of his achievements in the application of the principles of physical chemistry to the study of the origin of igneous rocks.

I To Walter D. Binger '16, by his appointment as chairman of the Advisory Board on Sanitary and Public Health Engineering to the Medical Division of the Office of Civilian Defense. RALPH E. TARBETT'05, as chief sanitary engineer of the medical division, is contact member.

¶ To Robert H. Aborn'20, by the awarding of the Lincoln gold medal by the Lincoln Electric Company at a meeting of the American Welding Society in Philadelphia. Mr. Aborn's paper, 'Metallurgical Changes at Welded Joints and the Weldability of Steels,' won him the award for the paper contributing most to the year's development of welding.

¶ To PER K. FROLICH'23, by his election as president of the American Chemical Society for 1943.

¶ To Donald G. Welch'26, by his election as Niagara Frontier chapter representative to the executive committee of the engineering section of the American Society of Safety Engineers.

Speaker

I Frank W. Caldwell'12 and Er-NEST M. PACE, JR., '17, at a dinner of the Philadelphia section of the Institute of Aeronautical Sciences, November 6. Louis C. Miller '28 spoke on "Determination of Airplane Critical Altitude by Flight Tests," before the same section.

■ VANNEVAR BUSH'16, in a radio broadcast, "Adventures in Science, from the new Science Service Building, Washington, D.C., December 13. Murray P. Horwood'16, about "The Role of Sanitation in Public Health," before the Oklahoma Public Health Association, Oklahoma City, December 18; and on "Further Observations on the Origin of E. Coli in the Human Intestine," before the Society of American Bacteriologists, Baltimore, December 30.

■ OTTO C. KOPPEN'24, on his spinproof, two-control training airplane, before the southern New England division of the Society of Automotive Engineers, Hartford, Conn., November 13.

■ Ernest E. Lockhart'34, on "Acclimatization in the Antarctic," before the autumn general meeting of the American Philosophical Society, Philadelphia, November 21.

Writer

I GARY N. CALKINS'90 with F. M. Summers, editors, Protozoa in Biological Research, Columbia University

ARTHUR G. HAYDEN '01, The Rigid-

Frame Bridge, 2d edition, Wiley.

¶ Frederic A. Fenger'09, Alone in the Caribbean; Being the Yarn of a Cruise in the Lesser Antilles in the Sailing Canoe Yakaboo, new edition, Dodd,

WILLIAM F. WELLS'09, with W. Henle, "Experimental Air-Borne Disease. Quantitative Inoculation by Inhalation of Influenza Virus," Proceedings of the Society for Experimental Biology and Medicine, Vol. 48.

A STUART CHASE'10, Primer of Economics, Random House.

CALVIN D. ALBERT'17, Machine Design Drawing Room Problems, 3d edition, Wiley.

I IRVING B. CROSBY '17, "Geological Investigation of Dam Sites on the St. Maurice River, Quebec," Journal of the Boston Society of Civil Engineers, October.

■ EDGAR E. HUME'21, Medical Work of the Knights Hospitallers of Saint John of Jerusalem, Johns Hopkins Press.

¶ Fay S. Lincoln'22, illustrated article, "Lincoln Photos Indoor Wild Life," U.S. Camera, January.
¶ James K. Clapp'23, "Using the

Cathode-Ray Oscillograph in Frequency Comparisons," General Radio

Experimenter, December.

¶ GORDON T. WILLIAMS'23, What
Steel Shall I Use?, American Society for Metals.

¶ HENRY B. KANE'24, illustrated books, Tale of the Whitefoot Mouse and Tale of the Bullfrog, Knopf.

I James L. Clifford '25, Hester Lynch

Piozzi, Oxford University Press.

¶ John E. Yarmack'25, "Selenium Rectifiers for Closely Regulated Voltages," Electrical Communication, Vol. 20, No. 2.

■ ROBERT S. HARRIS'28, "Nutrition in War," New England Journal of Medicine, Vol. 225; and with L. Mal-COLM MOSHER '29, "Effect of Reduced Evaporation on the Provitamin A Content of Lettuce in Refrigerated Storage," Food Research, Vol. 6, No. 4.

DEATHS

- * Mentioned in class notes.
- CHARLES R. FLETCHER'76, September 10.3
- ¶ HENRY B. DAY '80, December 1. ¶ Frank E. Came '81, December 11.
- CHARLES F. HOPKINS'81, November 13, 1940.
- ¶ George A. Mower'81, December. ■ John G. Eppendorff'83, September 24.*
- [Fred J. Arnold'86, December 25. ■ John K. Burgess'86, December
- WILLIAM S. BLISS'87, August 14.* I Frank O. Stetson'88, September
- I Howard A. Dill'91, November
- GEORGE W. VAILLANT'91, November 19.*
- CHARLES N. COGSWELL'92, December 5.
- ALBERT R. BEDDALL'93, November 3.
- RALPH W. ALLEN'96, October 11.* CHARLES H. PAUL'96, October 6.*
- ¶ David D. Field '97, October 11.*

 ¶ Paul Clifford '98, December 16.

 ¶ William Kelley '98, November 10
- WALTER C. WATROUS'98, December 1.
- HECTOR MACNEIL'01, August 24. A. E. HANSEN '02, October 24.
- ARTHUR F. BENNETT'03, December 1.
- ¶ Van I. Nettleton '03, July 20.* ■ RALPH H. NUTTER '03, December
- [Edward M. Richardson'07, November 16.*
- ¶ Aram Torossian '08, December 6. MANUEL V. MURIEL'10, January, 1941.
- ¶ Frederic C. Jewett'11, November 24, 1940.*
- C GEORGE L. SKOLFIELD, JR., '15,
- I RICHARD L. CORY'26, August 19. ■ WINTHROP T. NOYES'30, October 30.*

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Technology Club of Chicago

On Saturday evening, November 29, in the Old Town Room of the Sherman Hotel, we had what the preliminary notices called a "shindig." Some author once wrote: "A little nonsense now and then is relished by the best of men." There were plenty of nonsense and action at our party and a hilarious good time for all. We had no speakers' table, no stage, no guest speaker. Following a Thanksgiving turkey dinner, all the action was presided over by Rad Stevens'17, the efficient master of ceremonies. He was a whole show in himself. He could give the side-show barkers lessons in their art. The show itself was a mixture of vaude-ville, mirth, and melody (both vocal and instrumental), with some circus, including a clown, for good measure. Is vaude-ville as entertainment on the way out? Not the kind we had.

Remember when Kellar and Thurston sawed a woman in half? Among our acts we had a man with a guillotine. (Much more gruesome than a saw.) After proving the machine's efficiency by cutting a cabbage in half, the headsman selected one of our number, and, to the tune of a funeral march, he sprang the trap. The blade descended, and we next saw it under the neck of the victim. (There was, however, an instantaneous revival.) Our marionettes not only acted but sang, danced, and skated. The strip tease was performed by a kid on a unicycle. Perched seven feet above the wabbly single wheel, he divested himself of all but his under-

Credit for this unique affair which filled the Old Town Room must be given to the committee who arranged it. They were: Rob Rowe'20, chairman, Sherry O'Brien'17, W. W. Bainbridge'22, H. F. Metcalf'22, and W. H. Loomis'35. Special mention should be given to Ernest L. Byfield, father of Hugh N. Byfield'43 and president of the Sherman Hotel Company, who acted as booking agent for the artists. — Nelson C. Works'17, Secretary, Paine Webber and Company, 400 Rookery, Chicago, Ill. Lonsdale Green'87, Review Secretary, 5639 Kenwood Avenue, Chicago, Ill.

Technology Club of Northern Texas

Mr. and Mrs. Jonathan A. Noyes'12 held open house at their home at 4848 Northwest Highway, Dallas, on Sunday afternoon, November 30, honoring B. Alden Thresher'20, Director of Admissions at the Institute, who was in the city to attend a meeting of the Club the

following evening. All Alumni and former students of the Institute in the Dallas area were invited to come and bring their families and friends interested in Technology. About thirty-five responded. Mr. Noyes was recently elected president of the Club, and under his guidance more local activities may be expected.

Among those present were: Mr. and Mrs. William M. Gilker'03, Mr. and Mrs. Lester A. Russell'04, Frank F. Bell'10, Mr. and Mrs. Jonathan A. Noyes'12 and Ted, Priscilla, and Cornelia Noyes, Erasmus G. Senter, Jr., '17, B. Alden Thresher'20, Olin W. Scurlock'21, Mr. and Mrs. Charles M. Billman'25, Mr. and Mrs. William F. Herbert'25, Louise Jordan'31 and her mother, Dr. and Mrs. Dayton H. Clewell'33, Edward E. Simpson'33, Gerhardt N. Patitz'35, Mr. and Mrs. Beck, Mr. and Mrs. Bolby, Mr. and Mrs. Kenneth M. Bouve, Mr. and Mrs. Ferguson, Mr. Johnson and Phil Johnson, D. R. McCord, and John Scogin (son of John T. Scogin, Jr., '12). The next evening, December 1, the

The next evening, December 1, the Club held a smoker at the Dallas Athletic Club. Professor Thresher outlined briefly the activities of Technology, pointing out that in addition to carrying on its normal work, the Institute has placed its facilities at the disposal of those directing defense work and is making every effort to do the work it is best qualified to do. A large number of its official family are on loan to the government in part-time and full-time work. The new buildings recently completed are materially aiding the expanded activities.

Two very interesting reels of colored moving pictures were shown and discussed by Professor Thresher. They started with scenes of the freshman summer camp and then showed an aerial view of Technology. These movies enabled those present to visualize the rapid development of the Institute since their student days. Special attention was given to the Alumni Pool Building and athletic field. Sailing activities and the dinghy fleet aptly illustrated the growth of this popular sport.

Drastic revision of former admission requirements has been made. Students are chosen not only on the basis of scholastic record but on the basis of personal characteristics — tenacity, ability to get along with fellow beings, ambition, intellectual possibilities, and so on. Alumni and Honorary Secretaries contribute a great deal to the proper selection of candidates by interviewing students and giving them advice on admission requirements and by providing the Institute with a complete report on the personality, background, surroundings, past history, and ability of each student. Frank F. Bell '10 is doing a conscientious and fine job as honorary secretary in the Dallas area.

After Professor Thresher's talk, a general discussion was conducted.

Those present were: William P. Bentley '04, Lester A. Russell'04, Henry B. Thomson '06, Frank F. Bell'10, Jonathan A. Noyes '12, Erasmus G. Senter, Jr., '17, B. Alden Thresher '20, Olin W. Scurlock '21, Andrew G. Crowley '23, Charles M. Billman'25, Stuart W. John'26, E. Joe Shimek'31, Royal B. Jackman'32, Dayton H. Clewell'33, Edward E. Simpson '33, Hugh D. Sims'33, Gerhardt N. Patitz'35, Harris A. Kemp'37, Daniel T. McDonald, Jr., '39, and Paul S. Neblett '40. — Erasmus G. Senter, Jr., '17, Secretary, 210 Construction Building, Dallas, Texas.

Technology Club of Hartford

The Club held its first dinner meeting of the season at the Rockledge Country Club, West Hartford, on December 11. The incoming President, Thomas D. Green'26, presided. Forty-four members and guests attended the meeting.

Graham H. Anthony, President of Veeder Root, Inc., in Hartford, showed a colored film entitled A Day at the Circus. He gave an enthusiastic account of his experiences while taking the movie. The remainder of the program consisted of a reel of high-speed movies made by Harold E. Edgerton'27, Associate Professor of Electrical Engineering at the Institute.

Cider and doughnuts were served and a general informal get-together was enjoyed by the group. — Seated at the head table were Karl E. Peiler'04, Robert J. Ross'06, James A. Burbank'16, Andrew S. La Penta'22, Thomas D. Green'26, Louis J. Proulx, Jr.,'36, and Graham H. Anthony. — Louis J. Proulx, Jr.,'36, Secretary, 31 Wells Road, West Hartford, Conn. John A. Swift'27, Assistant Secretary, 155 Whitney Street, Hartford, Conn.

Technology Club of Florida

Thanks to Charlie Locke'96, Alumni Secretary, we learned that Horace S. Ford, Treasurer of the Institute, was coming to Jacksonville to visit his son at the Naval Air Station. The Club wined and dined Mr. Ford at the Spanish Restaurant in Jacksonville on Friday, December 12. He in turn entertained us with colored movies showing the extent of the national defense work now being carried on at the Institute. He also showed pictures of the new recreational facilities at Technology.

Horatio N. Parker'94 presided at the gathering. Among the other Alumni present were: Gerald M. Keith'12, George W. Simons, Jr.,'15, Alexander Brest'16, Charles E. Richheimer'28, Joseph H. Durkee'29, and D. Malcolm Fleming'33. — We understand that Dennie'11 has a son at the Air Station. We are

hoping that we may see Obie here before

Raymond W. Cushman'16, now a major, is doing sterling work as chairman of the Duval County-Jacksonville Defense Council. - GERALD M. KEITH '12, Secretary, 2695 Broome Street, Gainesville, Fla.

Technology Club of Kentucky

On December 29, local Alumni gathered at the Canary Cottage in Louisville at 7:00 P.M. for a holiday dinner meeting. Technology students home for the holidays were guests of club members. After dinner, those present enjoyed a talk by Joseph Rauch on "The Human and Machine Element in War."

Officers for 1942 were elected, and plans were discussed for the next year's activities. - Elmer A. Skonberg'29, Retiring Review Secretary, 1415 South Third Street, Louisville, Ky. Albert J. Klemka'36, Secretary, 1843 Roanoke Avenue, Louis-

ville, Ky.

Technology Club of Rhode Island

Thirty-four members met on December 5 at the To Kalon Club, 26 Main Street, Pawtucket, for dinner and an evening of fun. The cocktail hour started at 6:00 P.M. An hour later we started an excellent turkey dinner, during which our best storytellers were given an opportunity to tell their latest. Following the dinner, the poker and bridge fiends got busy while the rest of us adjourned to the bowling alleys to bowl, cheer, or jeer. At the To Kalon alleys, the big balls are used. Although few of us were familiar with this type of bowling, no one forgot to let go, and there were no casualties.

Our next meeting was held on January 7. Alumni and their wives enjoyed an excellent dinner at the University Club and then attended the Ice Capades at the Rhode Island Auditorium. — John M. Hanley 18, Secretary, Post Office Box 1366, Provi-

dence, R.I.

Technology Club of Schenectady

On December 17, the Club held its first meeting in nearly a year. In spite of the press of business, we agreed to hold meetings approximately once a month or once in six weeks. We shall hold them either at noon or in the evening, possibly in rotation, to afford Schenectady men opportunities to meet their fellow Alumni. THERON C. JOHNSON'33, Secretary, Engineering General Building 23, General Electric Company, 1 River Road, Schenectady, N.Y.

Technology Club of the Connecticut Valley

On Wednesday evening, December 3, the Club enjoyed its first meeting under the leadership of its new president, Otto C. Kohler'31, who ably presided over the dinner meeting held at the Edelweiss Chalet in West Springfield.

After a talk by Carl H. Lovejoy'10, several pitchers of beer were distributed, and a community sing was led by Morrie Nicholson'39. — The following were

present: Theodore F. Lange '01, Edward J. Ruxton'03, Frank J. Lange'09, Arthur H. Turner'09, Leonard O. Mills'11, Turner'09, Leonard O. Mills'11, Percival P. Gooding '16, Olen C. Norris 16, George L. Roy 17, Joseph E. Roy 18, William F. Dewey 20, Willard A. Emery 21, George A. Rowen 23, Henry R. Harris '24, Arthur E. Benson '26, Basil G. Constantine'26, Kenneth R. Shaw'26, Donald L. Ross'27, Richard S. Carroll '28, Irving H. Small'28, Daniel J. Hughes '30, Willard W. Selden'30, Otto C. Kohler'31, Richard M. Cochrane'32, Dirwood M. Danforth '32, C. Castle Day '32, Charles K. Jones '32, Albert D. King '32, Paul B. Samuelson'32, Kenneth A. Devine'33, Theodore O. J. Kresser'34, Adrian E. Ross'34, Jim Eng'35, Thomas W. Hafer'35, Laurence A. Stone'35, Louis C. Young'36, Francis P. Ford'38, Arthur F. Gould'38 and L. R. McCraw, Morris E. Nicholson'39, Walter B. Parker, Jr., '39, Marshall P. Bearce'40, Joseph F. Libsch'40, Norman T. Thomas, Jr., '40, Charles B. Cole'41, Sanford E. Glick'41, John F. Sexton'41, Edwin V. Sumner'41, and James S. Thornton'41.

— John F. Sexton'41, Secretary, 126 Maplewood Terrace, Springfield, Mass.

Washington Society of the M.I.T.

The November meeting was held on Friday the twenty-eighth at 5:00 P.M. at the Y.W.C.A., 17th and K Streets, Northwest. This meeting, featuring "Some Things M.I.T. Is Doing for National Defense," was an overflow affair, with over 150 M.I.T. men and guests present. Mert Emerson'04, presiding, introduced the officers and Honorary Secretaries present. He expressed regrets that it was impossible for Emery S. Land'07, Rear Admiral in the United States Navy, and Robert G. Caldwell, Dean of Humanities, to be with us. Dr. Compton took over at this point, introducing Henry B. Kane'24, who reported that a survey showed that approximately 400 of the 700 on the Institute staff were of draft age, and 80 were reserve officers. This situation offered a real problem, but the War Department saw eye to eye with the Institute in the advisability of keeping most of our staff on the job.

Local Selective Service boards soon showed that they recognized the importance of keeping the students on the job also, particularly after General Hershey's definition of what constitutes essential fields. Most students have received satisfactory decisions on deferment, although students may constitute quite a problem later, with approximately 78,000 college students now receiving occupational deferment. Reporting on the Alumni Fund, Mr. Kane said that as of November 24, there were 6,997 contributions totaling over \$67,000, contributions showing an

increase of 20 per cent.

The next speaker, Roy A. Seaton'11, dean of the division of engineering and architecture at Kansas State College, now in charge of defense training in the Office of Education in Washington, D.C., told of the need for qualified engineers

throughout defense work. Engineering schools generally are co-operating fully in this problem of training inspectors of explosives and other specialists.

Selskar M. Gunn'04 of the Rockefeller Foundation was the third speaker. He described problems in the public health field under present world conditions. Away from this country for twenty years, he was moved in March, 1938, from China to Paris. The Paris office was closed in June, 1940. We were interested to learn that public health institutions set up all over the world - in China and Czechoslovakia, for example - are still maintaining organization and are functioning even under present conditions.

Jerome C. Hunsaker'12, head of the Departments of Mechanical Engineering and Aeronautical Engineering at M.I.T., now chairman of the nation's Advisory Committee on Aeronautics, introduced himself by saying he got pushed into the last job by Vannevar Bush'16. He told us that we are now building planes planned two years ago and tested last year. He is under constant pressure to aid in deciding what will be next and when production will start - a matter of quantity versus quality, with the necessity for reducing only the best ideas to practice. He enumerated the expansion of research work and equipment in the aeronautical field and described the heavy responsibility resting upon the airplane industry in this country to produce in increasingly large quantities better planes than those of the Axis.

Vannevar Bush, the closing speaker, portrayed in stirring words the vital importance of Technology in today's world and the terrible responsibility for producing to the limit. The success of the country and of the world rests largely on our rapid adaptation in the transition from peace to war production. ing, Dr. Compton transmitted the greetings of the Alumni Council and extended his own congratulations on the large attendance and active work of the Wash-

ington Society.

The following M.I.T. men and guests enjoyed the talks and the dinner: C. Leonard Brown '88, Sanford E. Thompson '88, George W. Stone '89, John G. Crane '90, Alonzo J. Hammond '91, James Swan '91, Joseph E. Thropp, Jr., '94, Joseph W. Clary '96, Proctor L. Dougherty '97, Frederick A. Hunnewell '97, Martin Boyle'98, Sullivan W. Jones'00, Harry C. Morris'00, Marcy L. Sperry'00, Charles H. Stratton '00, John Boyle '01, William N. Brown '02, George E. Marsh '02, Howard C. Turner '02, W. Lorrain Cook'03, Merton L. Emerson'04, Selskar M. Gunn'04, Frank W. Milliken'04, George H. Shaw'04, Reginald A. Wentworth'04, George N. Wheat'04, Louis H. Tripp'06, John Mather'07, Edward D. Merrill'09, Kenneth P. Armstrong'10, J. Theodore Whitney '10, G. Arthur Brown '11, Elisha N. Fales'11, Carl G. Richmond'11, Roy A. Seaton'11, Frank L. Ahern'14 and F. L. Ahern, Jr., Alfred E. Hanson'14, Israel R. Paris'14, Dexter North'16, Edgar W. Huckins'18, Joseph Low '18, Hamat D. Manuelian '18, Joseph

Kaufman'19, A. Francis O'Donnell'19, Edgar R. Smith'19, James G. Strobridge '19, Wendell P. Sammet '20, Lawrence W. Conant'21, S. Paul Johnston'21, Kenneth Bernard'22, C. Ford Blanchard'22, Rudolf H. Blatter'22, Harry Diamond'22, David H. Harris'22, George R. Hopkins'22, William K. MacMahon'22, James R. Morton, Jr.,'22, William D. Pinkham'22, Eugene P. Rowell'22, Karl

E. Schoenherr' 22, Julian E. Berla' 23, William E. R. Covell' 23, Paul J. Culhane '23, and Robert H. Park' 23.

William V. Cash' 24, Clarence M. Chaffee, Jr., '24, George D. Fife' 24, George E. Lamb' 24, Raymond P. Schreiber'24, Henry C. Hoar'25, Chester H. Hosmer'25, Ralph Ilsley'25, John G. Fletcher'26, Joseph Y. Houghton'26, Robert M. Tucker'27, Frederick W. Willcutt'27, Albert E. Beitzell'28, Roland L. Hutchiose'28, M. Willey Hurchings'28, M. Waldo Keyes'28, S. Lindsay Lord'28, George D. Mock'28, Carroll C. Smith'28, Laurence L. De-Fabritis'29, John A. Plugge'29, Morris Smith'29, Nicholas P. Stathis'29, Alfred F. Bird'30, Jack R. Bloom'30, Irving M. Dow'30, Oliver G. Green'30, Richard M. Wilson'30, Mario V. Caputo'31, Freeman G. Corkum'31, George C. Humphreys '31, Tim L. McNamara'31, Robert M. Snyder'31, Stuart C. Westerfeld'31.

Snyder'31, Stuart C. Westerfeld'31.
John W. Flatley'32, Latimer W.
Glowa'32, Thomas H. Jenkins'32, G.
Arthur Lowery'32, Frederick M. Moss
'32, Harold A. Traver'32, Herbert M.
Wagner'32, Roger J. Zampell'32, Rodney
D. Chipp'33, M. Elsa Gardner'33, Maxwell DuV. Millard'33, Bernard Rubinstein'33, Eliot B. Bradford'34, Bernard
Goldforb'34. George E. Wuestefeld'34. Goldforb'34, George E. Wuestefeld'34, David B. Langmuir'35, Utley W. Smith '35, Marshall M. Holcombe '36, Edgar R. '35, Marshall M. Holcombe'36, Edgar R. Pettebone, 2d, '36, George V. Schliestett '36, Raymond J. Woodrow'36, Hyman Brettman'37, Edwin L. Hobson'37, George B. Hunter, Jr., '37, George B. Wemple'37, David S. Geer'38, Warden N. Hartman, Jr., '38, William H. Kashdan'38, Waldron S. Macdonald'38, C. Ronald Smith'38, James Andrias'39, William H. Deering'39, John E. Greenhalgh'39, Abraham M. Patashinsky'39, Elihu Root, 3d. '39. Frederick F. Schaller Elihu Root, 3d, '39, Frederick F. Schaller '39, Morton A. Copeland '40, Robert S. Harper'40, William G. Osmun'40, Sam Fry '41, Charles H. Papas '41, George B. Waterhouse and Ralph D. Bennett, staff, and V. C. Kylberg, J. M. Sharf, and S. W. Wallace. — Amasa M. Holcombe '04, Secretary, Apartment 202, 3024 Tilden Street, Northwest, Washington, D.C. WILLIAM K. MACMAHON'22, Review Secretary, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

Worcester County Alumni Association of M.I.T.

The Association held a guest night meeting at the Hotel Bancroft in Worcester on December 16. Karl T. Compton, President of the Institute, was the principal speaker. According to a Worcester paper, Dr. Compton told the group that "scientific work in this war is 'immeasurably better' than that in the last war."

The newspaper report read in part as follows: "Dr. Compton touched on the work of the New England Council in getting new industry and reviewed the work of scientists in the war from the vantage point of his chairmanship of a subcommittee of the National Defense Research Committee. This latter committee is an off-shoot of the Office of Scientific Research and Development which, in turn, is one of the two major divisions of the Office of Emergency Management. The other is the Office of Production Management — the familiar OPM.

"Dr. Compton's committee has five divisions dealing with micra-wave radio detection, fire-control for anti-aircraft weapons, instruments, infra-red devices

and camouflage."
Orville B. Denison'11 was installed as president of the Association, Robert J. Proctor '28 as vice-president, Arthur J. Lariviere '34 as secretary, and Robert N. C. Hessel'27 as treasurer. Executive committee members are: Andrew B. Sherman '06, Harold O. Berry'22, Gordon W. Browne '29, W. Franklin Baxter, Jr., '34, and Carl H. Wilson '34, retiring President. Charles E Locke '96, Alumni Secretary, brought greetings from the In-

stitute.

The following Alumni and guests were present: Edward Earl'91, Carleton A. Read'91, Harry M. Latham'93, Charles E Locke'96, Fred B. Dawes'98, Edgar W. Norton'98, William A. Wilder'98, William M. Bassett '02, Luis E. Vaughan '02, William A. Hyde'04, Harry S. Kendall'04, Andrew B. Sherman'06, Percy J. Colvin'07, John A. Bigelow'11, Orville B. Denison'11, Stanford H. Hartshorn'11, Harold L. Robinson'11, Arthur W. Johnson '14, Frank S. Hunt '16, Roderick L. Bent '19, Maurice E. Goodridge' 19, Ernest P. Whitehead '20, Herbert W. Reinhard '21, Kenneth G. Meriam' 22, Albert A. Gordon, 3d, '23, Forrest F. Lange' 23, Max Levine' 25, Frank H. Riegel' 25, Ervin W. Berry 26 Frank H. Riegel '25, Ervin W. Berry '26, Philip L. Hatch '26, Robert N. C. Hessel '27, Roger R. Smith '27, Maurice C. Beren 28, Angelo M. Altieri 29, Gordon W. Browne'29, Charles M. Perkins'29, Clifford A. Harvey'31, Howard F. Atwood'32, Oscar T. Marzke'32, Alanson G. Bowen'33, William F. Baxter, Jr., '34, Carl H. Wilson'34, Arthur J. Lariviere '35, George W. Coleman'37, Charles M. Dierksmier'37, Philip S. Wheelock'40, I. Chapitz, R. C. Gunter, Jr., P. B. Hanrahan, J. J. Osborn, and L. Scymonds.—Arthur J. Lariviere'35, Secretary, 7 Woodbine Street, Worcester, Mass.

CLASS NOTES

Charles Richardson Fletcher died in Los Angeles, Calif., on September 10. He was graduated from the Department of Mining and Metallurgy. Fletcher was born in Chelsea, Mass., on September 1, 1852. He attended the public schools in Chelsea, the Institute, and then took a postgraduate course of one year at the University of Bonn, Germany, where he was a schoolmate of Kaiser Wilhelm.

A record of the American Institute of Mining and Metallurgical Engineers, of which he was a member from 1885 to 1914, states that he worked in Boston from 1877 to 1901. He was listed as laboratory worker, lecturer at Boston University, miner and electric refiner, Massachusetts gas examiner, and Massachusetts assayer. In 1901, Fletcher went to Los Angeles, where he resided for the remainder of his life. John R. Freeman, former Secretary of the Class, communicated with Fletcher. On Freeman's death I continued the correspondence.

Not much definite information is on record, but there is enough to indicate that for the first twenty-five years of his residence in California, Fletcher had a busy and prosperous profession in geology and in metal and oil mining problems and development and that for the last few years he had been practically retired.

Fletcher was a great optimist.

Several times during the past twenty-five years there has been some dispute as to which class was responsible for the selection of the Technology colors. Here are some facts, as I know them. Just before graduation the Class of '76 set up a committee, of which Fletcher and I were members, to select colors for Technology. We detailed Fletcher to get some samples of ribbons from which the committee could choose, and from these the committee selected, with the recommendation of Fletcher, the red and the gray, which we wore to the Centennial Exposition at Philadelphia and which have ever since been the accepted Tech colors.

There must have been some occasion in 1916 which caused Freeman to bring up the subject of the colors. Clarke Freeman, John's son, has been kind enough to send me the correspondence between Fletcher and his father. I quote a portion of a let-ter from Fletcher to Freeman, dated November 4, 1916: "Your letter seeking the history of the colors of the Institute (cardinal red and gray) awaits my return here. I remember that history very well. The centennial year Class of '76 appointed a committee to select Technology colors, which up to 1876 did not exist, so as to wear the chosen colors to the Centennial Exposition in Philadelphia, where we went in a body and camped on the grounds of the University of Penn-

sylvania in tents.
"I recall clearly that it seemed to me strange that I was chosen on the committee, as the chairman was almost a stranger to me. Our Class was rather a large one for those days. Not only was the writer a member of that colors committee but he was the only one to obtain colors at the various Boston stores. We examined many and then discussed the colors. We all desired the cardinal red; it has stood for a thousand years on land and sea in England's emblem; it makes one-half of the stripes of our American flag; it always has stirred the heart and mind of man; it stands for red blood and all that red blood stands for in life. But

we were not unanimous for the gray; some wanted blue. The gray seemed to me to stand for those quiet virtues of modesty and persistence and gentleness which appealed to my mind as powerful; and I have come to believe them, from ob-servation and experience, to really be the most lasting influences in life and history. As gray was so long my ancestral color, of which somehow from youth I was especially fond, I quietly pressed its merits; and as it stood for iron and steel, and 'steel' (Bessemer steel) was only recently invented, the boys assented to it. Don't you recall how the boys cheered when we had finished presenting the colors and their meaning? Red blood and simple faith they always meant to me; I recall how glad I was for years, whenever I saw them, that we chose such a fine combina-

"Several times when receiving The Review I have thought it might be a nice thing to write a full little illustrated history of the Tech colors, but as I have felt so far away from Boston and so occupied, I never laid the suggestion before you or the editor. Since all of my abundant library and every one of my historic relics were destroyed in the great Chelsea fire, I cannot supply you with the original red and gray silks, which may have been in my Technology bundle. Anyway 'we' chose the colors and wore them to Philadelphia.

"The colors mean something; they were selected for their meaning as well as for their beauty; and I trust that throughout this Twentieth Century they will exert a good influence on the Institute. For surely a great day dawns, a new era, a new consecration. We are in transitional days now." In several later letters to Freeman, Fletcher wrote about the colors, substantiating his remarks in the 1916 letter. — Charles T. Main, Secretary, 201 Devonshire Street, Boston, Mass.

1883

John G. Eppendorff died in Buffalo, N.Y., on September 24. The following clipping is from the Buffalo Courier-Express: "John G. Eppendorff, assistant manager and director of Flint & Kent, department store, died . . . after an illness of several months. He was 79.

"Born in New Bedford, Mass., January 13, 1862, Mr. Eppendorff attended Technology and was graduated . . . in architecture. After practicing in New York City, he came to Buffalo in 1885 to execute an interior decorating commission. Three years later he formed a partnership with Austin Kent Muzzey and went to Chicago to establish an interior decorating department with S. A. Maxwell & Co. While there he did much of the decorating for the Chicago World's Fair. Coming back to Buffalo, Mr. Eppendorff was associated with William H. Prentice, interior decorator, until 1909 when he became assistant manager of Flint & Kent and later a director.

"Mr. Eppendorff was a past dean of the Saturn Club and one of its early members. He was a life member of the Buffalo Public Library and Buffalo Fine Arts Academy, and member of the Pundit and Pioneer clubs. He is survived by his wife, Marion Muzzey Eppendorff, whom he married in 1891; a daughter, Mrs. Howard Osgood, and a sister, Miss Lina Eppendorff of New York."—HARVEY S. Chase, Secretary, 431 Chase Avenue, Winter Park, Fla.

1887

A card from Arthur Nickels announced his arrival at Winter Park, Fla., where he is at his usual habitat at 358 Fairbanks Avenue. He appears to be enjoying himself at the usual winter sports of the Sunshine State.

The Secretary has received news of the death of two more of our classmates, William S. Bliss of San Francisco and A. W. Hayward of Cincinnati, Ohio. The former passed away on August 14, and your Secretary expects to have a brief sketch of his career in the near future.

Very little information is on hand regarding Hayward, other than that he passed away on February 17, 1939, in Cincinnati. After leaving Technology, he entered into a partnership with another architect under the firm name of Des Jardines and Hayward, specializing in suburban residences in Cincinnati and vicinity. — NATHANIEL T. VERY, Secretary, 15 Dearborn Street, Salem, Mass.

1888

Last September the University of Chicago celebrated the semicentennial of its founding. The only member of the original faculty present was a classmate of ours, Marion Talbot. Dean Talbot and the only other living member of that faculty, Amos Alonzo Stagg of Yale, were paid a fine tribute at the celebration.

Albert J. Perkins of Santa Ana, Calif., sends his best regards to classmates. He is a producer of citrus fruits. — How many of you remember '88's double quartet of which Ulie Holman and Ben Lockett were members? — The Secretary expects to hear from Bates, Eastman, and Foque for the next issue. — Nickerson has a fine home at Beachwood, opposite the bathing beach on Toms River, N.J.

Frank O. Stetson passed away at his home in Lynn, Mass., on September 21. After he left the Institute, he was chemist for the Nashua Iron and Steel Company, Nashua, N.H. He was an assistant in chemistry at M.I.T., chemist for the Salem Furnace Company in Virginia and the American Steel Wheel Company, and assistant librarian and assistant editor for the United States Weather Bureau from 1897 to 1907. From 1907 to 1908 he was assistant librarian for Stone and Webster, Inc.

Stetson wrote several articles on meteorology for "Nelson's Encyclopaedia." He was a member of the University Club of Washington, the American Philosophical Society, and the National Geographic Society. Stetson always planned to attend class reunions, but he frequently failed to put in an appearance for reasons he explained later. His jovial spirit will be missed by everyone who knew him.—Your Secretary's son-in-law, Eldon C.

Mayer, a lieutenant-commander in the Navy, was in Pearl Harbor on the fateful morning of December 7. The U.S.S. Ontario, of which he was in command, was in dry dock undergoing her annual overhauling at the time. He wrote that there were no casualties to his officers or crew. My daughter and the two children returned from Samoa on the last Matson liner in December. They were in Princeton for Christmas. — Bertrand R. T. Collins, Secretary, 39 Wiggins Street, Princeton, N.J. Sanford E. Thompson, Assistant Secretary, Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

1889

The press recently carried the following release about a very interesting activity of Mrs. Henry Howard: "Mrs. Henry Howard is one Miami visitor who works even while in the world's playground. Her days are occupied with volunteer work as president of the American Merchant Marine Library Association, which she founded in 1918. That group sent out 5,265 libraries and served 1,314 ships last year through eight dispatch offices located at Baltimore, Boston, Seattle, New Orleans, New York, Portland, Philadelphia and Sault Ste. Marie (there is located the only library, as far as Mrs. Howard knows, which stays open all night.) Mr. and Mrs. Howard spend a good part of their time cruising aboard their yacht, Alice (her namesake). . When they see a freighter Mrs. Howard immediately thinks, 'they probably have one of our libraries aboard.'

"Starting the library association was

'Starting the library association was an outgrowth of the work Mrs. Howard did during World War I, when she or-ganized the social service bureau for the recruiting service of the United States Shipping Board. Mr. Howard was originator and director of that service. As part of her wartime work, Mrs. Howard persuaded the American Library Association to help in sending out books to merchant marine ships. From a modest beginning offices spread to all important ports. After the war, however, the American Library Association could no longer continue in that role, and appointed Mrs. Howard to organize such a non-sectarian service outside its sphere. Since then, under her leadership the American Merchant Marine Library Association has served not only merchant ships but lighthouses, coast guard stations and ships from Alaska to the Gulf of Mexico. Many cities throughout the country hold annual book weeks and teas to replenish supplies. Financial assistance comes from seamen as well as shipowners and the

general public.

"Mrs. Howard says you could write a book about the travels of each book and that in this war nearly all merchant ships which have gone down have carried association libraries down with them. Libraries are sent out in chests, which always contain a Bible, a well-rounded collection, special requests from seamen, United States Health service literature, magazines, "The Seamen's Library Man-

ual' and 'Seamen's Handbook for Shore Leave.' The latter, originated by Mrs. Howard, covers points of interest in each port, laundries, seamen's homes, hotels, expense notes." — Walter H. Kilham, Secretary, 126 Newbury Street, Boston,

Our good friend and classmate George W. Vaillant died on November 19. He had attended many of our dinners and reunions over the years, and we shall miss him. Harry Young and Steve Bowen attended the funeral at Washington, Conn., George's old summer home. A wreath was sent from the Class as a token of

friendship.

Harry Young sent us the following sincere tribute: "George W. Vaillant died suddenly in New York City while on the way to his brother's house to spend Thanksgiving with his family. He had not been well for over a year. For nearly fifty years George lived at 165 Commonwealth Avenue, Boston. After being graduated from Course III, he became representative in New England of a Cleveland steel company. Afterward he was associated with Jackson Curtis Company and then became a partner in W. C. Wainwright and Company, bankers. While at Tech, George was a member of the old Hammer and Tongs Club. He belonged to the University Club and the Algonquin

"After retiring several years ago, Vaillant spent much of his time traveling. He spent one or two winters in Mexico and Yucatan, one in the East Indies, had been to Argentina, and made frequent trips to Europe — six of them with Steve Bowen. Steve Bowen and I probably knew George as well as anyone, as we traveled together and lived near each other. Every Sunday morning for a number of years we had been together for our walks. Our favorite walk was to T Wharf, where we three would sit on some old steps at the end of the wharf and light our pipes and look over the harbor and boats. There we would plan trips we should like to make and decide on boats we should like to take — all pipe dreams, but some of them came true. One trip will always be clear in my mind. We got onto a boat and went to Liverpool and then up to London for a month's stay together. George had read a detective story written around Half Moon Street, so we rented a flat on Half Moon Street and a valet who went with it. We went to the Ascot races and the international tennis matches and spent days walking over various old parts of London. Twice I met George and Steve in Paris to celebrate '91 class reunions while the Class was holding reunions on Cape Cod. George loved France and nearly bought a chateau near Bordeaux, but he didn't like the plumbing, which just didn't exist.

"He leaves three children: George C. Vaillant, curator of the American Museum of Natural History in Philadelphia; Marion W. Vaillant, principal of the Buckingham School, Cambridge; and Mrs. Benjamin Tenney, Pensacola, Fla."

Howard Dill passed on in Richmond, Ind., on November 22. The following is from a local paper: "Howard A. Dill, 72 years old, until a few years ago superintendent of the Richmond Water Works Corporation and who was assistant engineer of the Indianapolis sewage department in 1893 and 1894, died at his home in Richmond. . . . Howard Dill was graduated from Swarthmore College and . .Technology. He was a resident of Indianapolis from 1891 to 1895, treasurer of the Richmond Bicycle Company several years, superintendent and treasurer of the old Richmond city water works from 1898 to 1926, and superintendent of the Richmond Water Works Corporation until his retirement a few years ago.

'Mr. Dill was a director of the Richmond Social Service Bureau, Richmond chapter of the American Red Cross and a member of Richmond Rotary Club. Survivors are the widow, Mrs. Mary K. Dill; one son, Malcolm H. Dill of Cincinnati, O., and one daughter, Mrs. Douglas A. Graham, of Dayton, O."

Shortly before his death, we heard from Howard, who told of his retirement from business in 1939. In answering our questionnaire last spring, he reported four great-grandchildren. — Harry Young reported the only other great-grandchild.

Louis A. Simon has had a noteworthy career as an architect in Washington, D.C. The following article appeared in the Washington Sunday Star of November 30: "Louis A. Simon, supervising architect of the Public Buildings Administration, F.W.A. . . retires from Government service after 45 years of responsible work in supervision and design of Federal structures, many of which are here. Among the buildings are post offices, customs houses, court houses, hospitals and defense projects throughout the Nation, including the Federal triangle here. He is credited with design of the Roosevelt Library in Hyde Park, and because of this work the President extended his term of office five times after Mr.'Simon reached retirement age.

"He began his Federal career in 1896 on the staff of the old Office of Supervising Architect, then under the Treasury Department, and worked his way up to supervisor. He is credited with suggesting American colonial architecture for the post office at Annapolis, Md., 40 years ago, and this style has been declared one of the most delicate and beautiful ever developed. In recognition of his architectural ability, Mr. Simon was awarded a gold medal in 1935 by the Association of Federal Architects and the same year was made a Fellow of the American Institute of Architects, one of the highest

honors in the profession.

Frank Howard went to Haiti last fall and says he had a fine trip. He took some colored pictures which we hope to see at our next dinner. - Barney Capen has moved to Holliston, Mass., and is at "Maple Terrace," a sanatorium run by Mr. and Mrs. Van Vleet on Washington Street near the Masonic Hall. Mrs. Capen is living at her apartment, 364 Union Avenue, Framingham. Ralph Colburn, who lives in Holliston, called on Barney and reports that he has a nice large room and seems to be well cared for. - Dana and Hatch went to see Barney on December 20 and reported that he is nicely situated. He is in bed most of the time but is generally comfortable. He was interested to see the class book, which had iust come out.

Eli Bird writes from Philadelphia, Pa., that he is now living with his sister-inlaw at 1636 Pine Street. He is still working on bookplates and is considered tops in that line of endeavor. - Gorham Dana recently received a letter from Robert Ball in Cambridge, England: "I had a nice letter from Harry Young a few weeks ago. . . . He tells of the great success of the fiftieth reunion and that the boys rolled up from far and wide. When California sent a quota, it made all the greater my offense in not being present; but it could not be helped. That some were still able to play golf was delightful

to contemplate.

"We have become accustomed to the rigorous discipline of a country at war. Our goings and comings are circumscribed, but it is wonderful how, with cheerfulness, we take restrictions. Although we experience deprivation, we are not within sight of privation; nor are we likely to be. We feel that we have a great and mighty arm on our side from across the water, and if you could hear the nice things said about your country, it would make you glow with pride. . .

We read every scrap of news that we get of doings on your side and also listen to the broadcasts. Do you ever hear Raymond Gram Swing? He is an excellent speaker and has the merit of being able to put American affairs before the Englishman in a way that we can understand, for, if truth be said, the ignorance of our people about American life is astonishing to one who knows something about it. Swing was a correspondent for an American paper in London for ten years, part of the time in the press gallery in the House of Commons, so he knows at first hand the mentality of our legislators and

our problems.

Fred Blanchard is now living at 367 Holt Avenue, Winter Park, Fla. He had a bad fall on the train going down but is getting better and greatly enjoys the country and climate. Here are some ex-tracts from his recent letter: "We left Boston on the evening of November 7, arrived in Washington the following morning, and went to Jim Swan's home for breakfast. He has just bought a house in the Georgetown district, and, with his daughter Katharine to keep house for him, seems to be very comfortably and happily situated. Katharine took Mrs. Blanchard in her car to see Washington, and Jim and I had a nice visit going over the situation from high school onward. Jim has traveled much and remembers everything that happened, so he is very entertaining. His eyes are mending slowly, and he can read a little. It has been a tough experience for him.
"We left Washington and took our

train for Winter Park. This train runs al-

together too fast for the rough, crooked road-bed. It is a tough job to move from the sleeper to the diner and back. About midnight, as I was standing in our little bedroom, the train must have hit a sharp curve and I was thrown down in a heap on the floor. I think my back hit the door-knob. The fall gave me an awful wrench. By now, however, my back has greatly improved, and I hope some day to be able to enjoy the outdoor activities made possible by this beautiful climate. My greatest excitement now is to sit in the sun or take an occasional short auto ride.

take an occasional short auto ride.

"We are now very happily situated in a small 'garage apartment,' fairly new and meeting all our needs. It permits us to be quite independent and have the food we want, cooked in our own way. I am afraid Southern cooking does not appeal to us. We have grapefruit and oranges on our own trees. The country near here is far superior to St. Petersburg. It is full of lovely lakes, fine residences, and beautiful trees and gardens. Orlando is close by and has good shops of all kinds."

We have heard of Alice Gould from her attorney in Boston. He says she is in Spain and will probably have to stay there for the duration of the war. — We were glad to have a line from Charles Andrews, as we had not heard from him recently. He has lived in North Easton, Mass., for many years. His wife has been

ill for some time.

Bert Kimball wrote us after his return to California: "Our reunion was a great success, and you and the committee should be congratulated on the result of your efforts. I enjoyed every minute. After the reunion was over we made some family visits and started back on July 10. Soon after my return I called on Charlie Garrison and gave him the ash tray. Mine is in constant use." — A note from Arthur Alley at National City, Calif., again expresses his regret at not being able to attend our fiftieth. Apparently all is well with him, and he is too far from the coast to worry much about the Japs.

the coast to worry much about the Japs. Charlie Ricker is back in Havana for the winter. The life of a farmer in New York State seems to appeal to him right now. Some of us may have threatened to take up farming, but few have had the courage. He wrote: "I finally acquired a small farm in Great Valley, N.Y., close to Salamanca. This is just north of the Allegheny State Park in New York and the Allegheny National Forest in Pennsylvania. I hope to begin living there next spring and look forward to learning a new trade. I shall send you some photographs when I reach Havana. I was feeling sore at having to go back to Cuba for the winter, but maybe it will be good for me after all. The Allegheny Mountains are beautiful country, but it gets plenty cold there in winter.

"I have been getting acquainted with my granddaughter, age fifteen months, who is just beginning to walk alone and has taken to me as an instructor, perhaps because I do what she wants with fewer objections than her parents, who have something else to do when she wants to be waited upon. She is the best-natured member of my family and also the best

looking."

Margaret Maltby is now in New York. She didn't like San Francisco climate; too much rain, fog, and the chill winds "affect your joints." — Charlie Garrison wrote us on October 30: "I just had a letter from Bill Greer, who is visiting at 601 Avenue G, Boulder City, Nev. I suggested that he get in touch with you and join the Class again. This should be 'A-Greer-Bill.' We have been in Berkeley for ten days with our daughter and drove to Grass Valley in the old gold-mining country. Professor Rayee of Harvard was born in that town. Tomorrow we go to San Marino to spend a few days with our son and his family."

Our golden reunion book will be in your hands before you read this. How do you like it? Gorham Dana and his committee did a fine job! And the cover by Eli Bird is a gem! He told us just how to do it, color scheme and everything.

The following new addresses have been received: Edward S. Blackmer, R.F.D. 38, Plymouth, Mass.; Ambrose Walker, Winter Park, Fla.; Medorem W. Greer, 601 Avenue G, Boulder City, Nev.; John S. Cook, 5421 South Marshfield Avenue, Chicago, Ill.; Charles W. Ricker, Post Office Box 1715, Havana, Cuba.—HENRY A. FISKE, Secretary, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I. BARNARD CAPEN, Assistant Secretary, Maple Terrace, Washington Street, Holliston, Mass.

1896

On the very day that these notes are being written, Wednesday, December 24, the Secretary had luncheon with Arthur Baldwin and his son Edward'30 at the Parker House in Boston. Arthur and Mrs. Baldwin had traveled north from Charlottesville, Va., to spend a little time in Boston and to have Christmas with their son's family. We suspect that Arthur has a warm spot in his heart for Boston, since periodically he has an attack of nostalgia which can only be remedied by a trip to New England. He reported that he was fully settled in his new home at Charlottesville, living a quiet, peaceful life in the country and keeping active by pursuing various hobbies, musical and otherwise, for which he had not had the necessary time while he was active in business. Sadly enough, on this particular day we could not give Arthur any real New England scenery in the form of snow, but instead a copious downpour of rain came from a southeasterly storm, with a temperature of 50 degrees Fahrenheit.

Billy Anderson was in Boston for a week or more early in December, and Rockwell saw him several times at the Hotel Copley-Plaza, both socially and professionally, as Billy was suffering from a little temporary indisposition. He was here to attend to some affairs of his son, who has gone into the service. By the time Billy was ready to return to Cincinnati, his ailment had succumbed to Dr. Rockwell's treatment and, we are glad to say, he was practically back to normal.

— The Secretary has received from H. C.

Lythgoe a reprint of his paper on "Determination of Lead Content of Commercial Ciders and Vinegars by Spectrographic Methods," of which Lythgoe was co-author with Charles W. Schroeder, also in the Massachusetts Department of Public Health. This paper appeared on page 829 of the analytical edition of Industrial and Engineering Chemistry of November. — Ralph Henry has finally come through with the definite information that his grandson is Christopher Jordan Kirchberg, born on August 5. According to Ralph, he is a great boy and may be destined to become a famous engineer or scientist.

The Class in general, and the New York group of '96 in particular, are under great obligation to R. E. Bakenhus for taking the lead in promoting class activity around New York City. The Admiral's latest move was to send out post cards calling for an informal class dinner. This was a very enjoyable affair, as evidenced by the following report submitted by the Admiral: "Eight members of the Class from New York City and vicinity had an informal dinner at the Columbia University Club, New York City, on Wednesday, December 10. Those present were: Bakenhus, Gaylord Hall, Jim Melluish, Father Partridge, L. K. Sager, Harold Stevens, John Tilley, and Charlie Trout. Louis Freedman sent his greetings but could not come. Ruckgaber also sent word that he was sorry he could not come, and Charles H. Hall sent 'My best to all of you.' Sending out the cards for this gathering brought to light one sad fact, namely, that our classmate Ralph

W. Allen died on October 11.

"Father Partridge, who is in much better health than he was a year ago, drove from Philadelphia via his home in Flushing to get to the dinner, and he was in fine fettle. A few stories were told, old times were rehearsed, and inquiries were made about families; but beneath it all was a deep-seated feeling that we had gone through much of life together with the same training and the same spirit, though in many different fields. A few of us were together once more, planning for the next reunion at the fiftieth anniversary of our graduation and wondering how many would get there.

"All the members of the party showed wonderful spirits, and each one of them had accomplished much in life. We should have more gatherings of this kind. Those present, and others in New York, too, are looking forward to the annual gathering in New York in February when our esteemed Secretary and mainstay will be the guest of honor. — From the reply cards for this gathering the following address changes were obtained: Charles H. Hall, 129 Columbia Heights, Brooklyn, N.Y.; Welles M. Partridge, 1409 Albermarle Road, Flatbush, Brooklyn, N.Y.; James G. Melluish, 867 West 181 Street, New York City."

Ralph Whittier Allen died on October 11. He took the course in mechanics arts with our Class. He was born on January 3, 1862, in Manchester, Mass., the son of Luther F. and Susan E. (Andrews)

Allen. He married Millie L. Edwards on June 28, 1888, and there were three children: Elsie R., born on October 21, 1889; Raymond N., May 27, 1895; and Chauncy N., August 15, 1900. Ralph also had five grandchildren. His career was that of a teacher, first as director of drawing at Harrisburg, Pa., and later as a teacher of drawing in New York City. He had been retired for the past few years. He was particularly interested in scouting, and his publications consisted of numerous articles on school work and scouting.

Our classmate Charles H. Paul passed away suddenly in Dayton, Ohio, on October 6. He studied civil engineering with our Class, but because of his father's death was unable to carry through the Course to graduation. Charlie was born in Rockport, Mass., on March 10, 1875, the son of Howard H. and Lucy D. (Dousette) Paul. He married Camilla M. Wheeler on June 19, 1907. He had a notable career as a civil engineer, holding successively positions as follows: Boston Sewerage Department 1895; Massachusetts State Board of Health 1895-1896; Metropolitan Water Board of Massachusetts 1896-1900; Bureau of Filtration in Philadelphia 1901-1904; United States Reclamation Service 1904-1915 as construction engineer on irrigation projects in Montana, Idaho, Oregon, and Wyo-ming, and in charge of the design and construction of Arrow Rock Dam; Miami Conservancy District in Ohio as construction engineer, chief engineer, and later consulting engineer for dam foundations, irrigation, and flood control work from 1916 to the time of his death. When he became consulting engineer for the Miami Conservancy District, he opened his own office in Dayton for private practice and was busily and happily employed. His advice was sought in connection with the planning and construction of many of the largest dams in the country, and he had a national reputation in the profession on this type of work. He was chairman of the board of consulting engineers of the Grand Coulee Dam and for the Central Valley Project in California.

Charlie was an active member of the American Society of Civil Engineers and served as a director for several years. He maintained a keen interest in class and Technology affairs. He was active in the M.I.T. Club of Dayton, of which he was once president. Unfortunately, in his busy life he had not found time to attend our class gatherings and reunions. He had fully expected to be with us for the observance of our forty-fifth anniversary, but when the time came, he was just too

busy to get away

Charlie was highly regarded in his community, where he was looked upon as a remarkably fine man of outstanding character. He took a great interest in civic matters, and about fifteen years ago, after considerable pressure, he consented to serve as a city commissioner of Dayton for one term. He was much interested in the Y.M.C.A., of which he was past president, the Community Chest, of which he was a director, and the Engineers Club, of which he was past president. He was also past director of the Moraine Park School in Dayton. He was the author of various contributions to the technical press and professional society publications on subjects dealing with temperature changes in mass concrete, core studies in hydraulic fill dams, dam foundations, construction plant methods and costs, the industrial history of Dayton, and methods and plans for excavation and embankment. His recreations were motoring and golfing, and, in earlier years, tennis, and he had been director of the Miami Valley Golf Club. His sudden death was a great shock to all his triends, who will miss his influence and companionship.

Finally, here is just a reminder not to forget about the Alumni Fund. If you have not already sent in your contribu-tion, do not delay longer. If good fortune has befallen you, increase your earlier contribution. — Charles E Locke, Secretary, Room 8-109, M.I.T., Cambridge, Mass. John A. Rockwell, Assistant Secretary, 24 Garden Street, Cambridge,

Mass.

1897

David Dudley Field, II, died in Stockbridge, Mass., on October 11 at the age of 66. He was born in San Francisco. After leaving the Institute, he joined the New York Telephone Company, for which he worked continuously except for two years when he was in Switzerland helping his father build streetcar lines. He leaves his mother and a sister.

Field came from a very distinguished family of lawyers and ministers. His father, Stephen D. Field, was an electrical inventor. Among his many inventions are the multiple-call telegraph box, the electric elevator, and the rapid stock-ticker. He was related to Cyrus W. Field, the layer of the first Atlantic cable, and Stephen J. Field, an associate justice of the United States Supreme Court. - John A. COLLINS, JR., Secretary, 20 Quincy Street, Lawrence, Mass.

1901

Some years ago the Class pledged \$50.00 a year to the Alumni Athletic Fund, and we are glad to report that the treasury had a sufficient surplus to keep the promise again this year. We quote from a letter of acknowledgment from Ralph T. Jope '28, Secretary of the Advisory Council on Athletics: "We who serve on the Advisory Council on Athletics appreciate the continued support given us in our activities by the Class of 1901. Our deepest thanks go to you, and through you to your classmates, for the continuance of the generous check for \$50.00 year after year. Our present Athletic Council still misses the guiding hand of your classmate, Allan Winter Rowe. When we tackle difficult problems we always think what Dr. Rowe would have done under those conditions, realizing that we shall never be able to handle the situation as competently as he.

At the class meeting at the reunion, Theodore H. Taft was elected assistant secretary and also was nominated as class member of the Alumni Council to succeed, or act as a substitute for, Willard Dow. Since then Dow has resigned because he expects to remain in St. Louis for some time and will, therefore, be unable to attend the Council meetings. The Alumni Secretary has been notified that Taft is our official class representative. We are sorry to lose Willard Dow, but we are fortunate to have Theodore Taft replace him.

An article in the New York Times told of the presentation of the Vermilye medal to William S. Knudsen, director of the Office of Production Management. The article stated that our classmate, William M. Vermilye, vice-president of the National City Bank of New York, is the donor of this biennial award, which has been given only once previously. The medal was presented at a gathering of several hundred industrial, financial, and scientific leaders at the Franklin Institute. The citation accompanying the award said that it was given for Mr. Knudsen's "far-seeing vision and human understanding, culminating in invaluable service to his country in the administration of unprecedented production for national defense.

The annual class letter will go out shortly, and we are hoping for a large number of responses to the request for news about you or your friends. Remember to fill out and send in the sheet attached to the class letter. We should particularly appreciate receiving a few words from classmates who seldom write to the Secretary. — Guy C. Peterson, Secretary, 788 Riverside Drive, New York, N.Y. THEODORE H. TAFT, Assistant Secretary, Room 3-266, M.I.T., Cambridge,

Mass.

1903

Word came to us recently through C. E. Chase, I, of the death of Van Nettleton, I, last July. Van, his wife, son, and son's wife were driving from St. Louis to New Jersey. On the Pennsylvania Turnpike, Nettleton lost control of the car, went off the road, and turned over several times down a high embankment. He and his wife were instantly killed, but the other two escaped serious injury. Nettleton was captain of Company B of the cadet corps in our freshman year, and your Assistant Secretary was his top sergeant. We had most of the tall men like Aylsworth and Bennett in our company. Éven now we remember Nettleton's ruddy cheeks and happy way.
We are indebted to S. L. Wonson, '01,

for the following account of Nettleton's career with the railroad: "Van Irving Nettleton entered the service of the Missouri Pacific Railroad Company engineering department on September 21, 1903, as a draftsman, and in July, 1907, he was promoted to chief draftsman. In July, 1916, he was promoted to assistant right of way agent, and on January 1, 1928, he was appointed right of way agent, which position he occupied until

his death.

'He was a conscientious and competent member of the engineering staff, and he

won and kept the respect and affection of his associates and his large circle of friends. As right of way agent, he handled the purchase of all lands for Missouri Pacific as well as the sale of all lands sold by the railroad company, except land grant land. His experience gave him a thorough and intimate knowledge of land values in the states through which the Missouri Pacific operates, and his knowledge of these matters was such as to command the attention not only of the engineering and operating departments but also of the law department. This thorough knowledge of values, together with his attractive personality, enabled him, in the majority of cases, to purchase land at reasonable prices rather than at the excessive amounts very often demanded from railroads and other public utilities.

Katharine Blunt, V, will retire as president of Connecticut College at the end of the present academic year. She is a graduate of Vassar College and the University of Chicago, whence she received her doctorate degree in chemistry. She also holds honorary degrees from Mt. Holyoke College and Wesleyen University. Recently she was awarded a medal by the University of Chicago for outstanding achievement. Dr. Blunt is retiring after twelve years of leadership in which she saw Connecticut College become one of the country's outstanding women's educational institutions.

The Springfield, Mass., Union of November 15 carried the following story about Ed Ruxton: "Edward J. Ruxton, treasurer of the Adams & Ruxton Construction Co., was elected by the board of trustees yesterday to be president of the Springfield Taxpayers' Association for Mr. Ruxton is its new fiscal year. . . . a former member of the Board of Aldermen and is now chairman of the Fire Commission. For many years he has been a leader in many civic activities. He is a member of the Board of County Trustees for Aid to Agriculture, which co-operates in the direction of extension work through the Hampden County Improve-ment League." We wish both Dr. Blunt and Ed the best of luck. - Frederic A. Eustis, Secretary, 131 State Street, Boston, Mass. James A. Cushman, Assistant Secretary, 441 Stuart Street, Boston, Mass.

1907

Responding, as usual, to the request from the Advisory Council on Athletics for a contribution from the Class, Harold Wonson, our Treasurer, sent a check for \$25.00 to Ralph Jope '28, Secretary of the Council. Ralph wrote his thanks, saying: "We on the Athletic Council appreciate very much the support which the Class of 1907 has rendered for the past several years.'

Edward M. Richardson, II, died on November 16 at his home, 21 East 52d Street, New York City, where he had kept bachelor quarters for many years. Ever since 1907 he maintained an office at 522 Fifth Avenue, New York, for the handling of securities. His nearest surviving relative is a nephew, Richardson Harwood of Natick, Mass. Edward was a member of the St. Anthony Club of New York

Hud Hastings' elder daughter, Margaret, was married on December 27 to Ian Craig Loram at Marquand Chapel, New Haven, Conn. — Through an inspector for the Associated Factory Mutual Fire Insurance Companies whom I met by chance, I learned that Everett Turkington, who has been with these companies in their electrical department for many years, became their chief electrical engineer during the fall of 1941. Through Lonsdale Green'87, I learned that Ralph Crosby of our Class gave a very concrete manifestation of his loyalty to Institute affairs when he drove from Springfield, Ill., to Chicago, a distance of 190 miles, in one afternoon in order to attend the gathering of the Technology Club of Chicago which is described elsewhere in this issue of The Review. Mr. Green writes: "It goes without saying

that he was warmly greeted.' In the Boston Herald of December 19 was a picture of John Mather (of whom I wrote in last April's Review) accompanied by a note to the effect that he was promoted to the rank of brigadier general on the preceding day and that he had become commanding officer at the Watertown Arsenal. - Harold Wonson wrote me in December saying that in response to his letter of November 3, sent to all '07 men whose names are on our mailing list, he had received checks from 90 fellows for a total of \$272.00, one man having sent \$5.00 instead of the \$3.00 suggested. In practically the same period of time five years ago, when dues were asked for, replies were received from only 34 men. Comparison indicates at least two things the effectiveness of Harold's letter and the fine co-operation of a good proportion

of our classmates. It is trite but fascinating to remember that we are one month nearer to the time of our thirty-five-year-reunion at Oyster Harbors Club, Osterville, Mass., on June 5 to 8, 1942. Definite enthusiasm for this event is indicated by many of our mates. In addition to the lively message from Sam Marx which all '07 men have read on the post cards I sent out, pledging the attendance of himself and John Frank and Stud Leavell, here are some of the expressions of interest which have come to either Harold Wonson or me. Willis Waldo of Washington, D.C., writes: "Hope to see you at the reunion." From Hud Hastings: "Here's good luck to you until I see you in June." Howard Marvin, management engineer in New York, 'I am planning to attend the Ostersavs: ville reunion." Lester Brock wrote to Harold: "Hope you live to get to the shindy. Hope, too, that I shall see you there." From Sam Coupal, director of the Department of Mineral Resources of the State of Arizona: "Best wishes. I'm looking forward to being with you at the thirty-fifth reunion next June." Hermann Mahr, superintendent of the dye works of E. I. duPont de Nemours and Company at Wilmington, Del.: "I run into other '07 Du Ponter men - Frank MacGregor and Dick Woodbridge - quite often. The conversation is for a solid delegation from here to the reunion." Milton MacGregor: "Hope to be able to connect with some of the festivities of our thirty-fifth." Phil Walker, maintenance engineer of Whitin Machine Works, Whitinsville, Mass., speaking: "We are all looking forward to that thirty-fifth reunion in June, 1942.'

Under date of December 17, I received a fine letter from Emory G. Hukill, 2524 Guilford Road, Cleveland Heights, Ohio, from whom I had not heard directly since 1927. He writes: "I was president of the American Petroleum Products Company until it passed into liquidation in 1928. At about that time I formed the American Petroleum Company, with offices in Cleveland, Tulsa, Dallas, Chicago, Detroit, and Pittsburgh. Then I was also president of the Allegheny-Seaboard Oil Corporation with offices in Warren, Pa., Buffalo, Rochester, and New York, N.Y. At about the same time, we liquidated the Akron Oil Company, of which I was treasurer, a jobbing concern of some twenty-eight filling stations in Akron. I was also chairman of the board of the Ajax Oil Company until it was sold to the Cities Service Oil Company in Philadelphia.

"My son, Emory, Jr., went to M.I.T. in 1934 and was graduated from Case School here in Cleveland in 1937. He was married in 1938 and is with the Harshaw Chemical Company of Cleveland as a chemical engineer. My daughter Frances attended Erskine School in Boston from 1934 to 1937 and was graduated. She married James M. Anderson, a young engineer in the employ of the Eaton Axle and Spring Company of Cleveland, in

May, 1941. "In June of 1935 I met with a serious accident — was driving home from Grand Rapids, Mich., when an automobile ran into our car and demolished it. I was almost demolished, also, and ever since I have been trying to get well. - I made two trips around the world and one around South America, spending my winters in Florida, California, Texas, and Ohio. I am certainly going to try to attend the meeting of the Class at Osterville next June." - BRYANT NICHOLS, Secretary, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, Assistant Secretary, Commonwealth Shoe and Leather Company, Whitman, Mass.

1911

In November, 1940, Frederic C. Jewett, I, who was with us for a year and a half only, died at his home in Marblehead. For many years he had been with the Parker Shoe Company there, but a while ago ill health forced his retirement. He had been acting as burial agent and animal inspector for the town of Marblehead.

Alf deForest, XIII, one of our members on the Faculty at Tech, is spending a lot of time now in Chicago directing a training course for Magnaflux inspectors. This invention of his, Magnaflux testing for

metal flaws, is spreading through large areas of the defense program, he says, and it is important for him to provide as much judgment as possible where new problems are involved. "Technology is sunk to hatches under the National Defense Research Committee and other projects," he wrote, "and students must know how to swim!"

In his presidential speech at the annual meeting of the American Standards Association in New York in mid-December, Rufe Zimmerman, IX, said the entire defense effort had been seriously hampered by the diversity of specifications and requirements for products, acutely so in the case of strategic materials. "Many a manufacturer," he told three hundred representatives of trade, technical, and governmental groups, "who is today facing a shurdown as a result of the defense program, through lack of source materials, would have been able to carry his full part in production had we had a full complement of American standards to which our manufacturers, big and little, were accustomed to working. conclusion he pointed out that standardization is now going forward in this country at a rate never reached before, and a short-cut emergency method of developing standards for defense is being adopted right now.

Another presidential chore of interest to us occurred in Newark, N.J., the first week in November, when John Taylor Arms, IV, our noted etcher and president of the Society of American Etchers, was guest at the luncheon which previewed the American Art Week celebration there. He is also second vice-president of the National Academy and founder and president of the American National Commit-

tee of Engraving.

Carl Richmond, I, Major, Corps of Engineers, Production Branch, Office of Undersecretary of War, is a tower of strength to me in Washington, where many classmates are now stationed in civilian and service work in the emergency. He wrote recently of a fine dinner meeting in Washington where President Compton and Vannevar Bush'16 were guests of honor. Carl said, "The outstanding feature of the meeting, for'11, was the highly informative speech made by Roy Seaton, II." As recorded in last month's class notes, Roy recently transferred to Washington from his work as dean of engineering at Kansas State College. He is now in charge of the engineering, science, and management defense training program of the Office of Education, and at the dinner referred to he gave a general picture of the enormous educational program which he has headed in the interest of national defense.

Carl said he met one classmate whom he had not seen for twenty-five years or more - G. Arthur Brown, X, who is in the Office of the Quartermaster General, engaged in chemical engineering work as a civilian. His office is 4074 Railroad

Retirement Building.

"While at Wright Field, Ohio, after Thanksgiving," Carl continues, "I was very much disappointed not to find

George Kenney, I, in his office. George had gone to Buffalo at just that time. Harold Lord, II, has now left the Army to re-enter the employ of Hollingsworth and Whitney Company, Boston paper manufacturers, and his new home address is 17 Patriots' Drive, Lexington, Mass. Harold's place as a major in the Office of Undersecretary of War has been taken by J. Theodore Whitney '10, who was my company commander when we were freshmen. While I very much regretted Harold Lord's leaving this office, it has been just about perfect to have his place here taken by Whitney, with whom I have had contacts off and on ever since our school days.'

We were all very happy here inWorcester on December 16 to have a visit from President Compton, who spoke to the Worcester County Alumni Association on "Scientists At Work: Defense Today, Prosperity Tomorrow." It was my pleasure and privilege to sit with and introduce Dr. Compton, for the Club has elected me president for another year, my previous term having been in 1937-1938. Other classmates here in "The Heart of the Commonwealth" include: Fred Daniels, VI; John Hassett, V; Herb Larrabee, VI,

and Hal Robinson, I.

Sara and I have been pleased no end with the many Christmas cards received from you classmates. Thanks a lot, and may 1942 bring you all the good things you deserve! — ORVILLE B. DENISON, Secretary, Chamber of Commerce, Worcester, Mass. John A. Herlihy, Assistant Secretary, 588 Riverside Avenue, Medford, Mass.

1913

Jack Coe, X, was among a group of four outstanding men of affairs caricatured in the Boston News Bureau of October 2. The pen-and-ink sketch of Jack, showing him holding a gas mask, is a good likeness. Jack has been with United States Rubber Company since 1913 and is general manager of the Naugatuck Chemical Company division. He is a gas mask specialist, having designed a gas mask used by the Navy in the last War. His hobbies are horseback riding and sailing. - Bill Brewster, II, has been

Plymouth Cordage Company.

William V. Kemp, XIV, has a knack of hitting the high spots. The following appeared in the Washington, D.C., Herald of October 13: "He talks sixteen to a dozen, but it is all worth listening to. He earned a fortune in Wall Street and is still hanging on to the money. When he came to Washington . . . to help the War Department buy arms, as 'executive assistant to production in ammunition,' he was offered the title of Lieutenant-Colonel; he refused flatly. Friends think it is because he wants to be able to say to his superiors what he feels like, even when it is not too pretty. . . . Most important of all, William Van Antwerp Kemp's brains are crystal clear and sharp as a razor.
"I am the only man who was born on

Manhattan Island,' he says, and all the

people around him stop to listen, because his voice is vivacious and strong. 'I went to Williams College. . . . Then I studied at the Mass. Institute of Technology but the gambling bug stung me and I went to Wall Street. It was fun while it lasted and I kept the money - or let me be frank, my wife did. She even bought me an annuity. I have a farm up in Bucks County, Pa. — God bless it. . . . The house is quite lovely, too, 150 years old, and there is plenty of barking going on because the place is infested with spaniels.

'But when I want to feel perfect freedom and happiness I go to Lake Ontario and sail on the St. Lawrence River. I have three boats, just small 35-footers. They can be manned by myself and three willing slaves.' And he laughs boisterously with a strong undertone of life and teasing. 'If I should live all over again I should do exactly what I have done because I wouldn't have brains to do any different,' says the man who knows all about ammunition and human beings."

Harry Braude, X, is president and treasurer of the Chandler and Farquhar Company of Boston. Steve started out as a chemist, but he soon found his niche in business. His company is very large and active in the New England general mill

supply business.

Good old Ed Cameron, I, is the Secretary's friend. He writes: "For your edification I am enclosing a copy of the October Tech Engineering News, which has my story, 'Pick Your Job, Sir.' It tells the boys how a job of engineering construction is run, from the time the idea first enters the promotor's head to the time when the consulting engineer leaves the owner's office with his final check. It starts, of course, with that famous piece of construction, the house that Jack

"I am also sending you a more serious article called 'A Pile Driver's Respects," which The Review published last May along with a parallel article on engineering education by William H. Timbie, Professor of Electrical Engineering at Technology. Leastways, it was supposed to be serious, but a friend who read it said: 'Ed, by the time I got through I wasn't sure. Were you joking through it all or not?' — I pity guys with a sense of humor. I'm glad I haven't any. What things I write or say that seem funny usually get me in trouble, anyway.

'I'm busy on the structural design of two power stations; power goes as defense work, you know." — Ed's two articles are good reading, particularly "Pick Your Job, Sir." The subject is dry, but

the writing is far from that.
Arthur Townsend, II, nabbed busy Larry Hart, XI, for an unofficial class luncheon in October. Arthur wrote: 'Larry Hart dropped into the Institute recently and gave a talk on sales and sales engineering as a career for engineering students to our senior class, which now is beginning to think about jobs and placement after graduation. Larry did a swell job, as we would naturally expect. He stayed over for lunch here at the

Institute. The luncheon party included Nat Sage, Joe MacKinnon, Pa Ready, and myself. Larry looks fine; prosperity appears to agree with him. As you know, he is now vice-president and general sales manager of the Johns-Manville Sales Corporation." — Frederick D. Murроск, Secretary, Murdock Webbing Company, Box 784, Pawtucket, R.I.

1914

The news that Ernest J. King had been appointed commander-in-chief of the United States Navy fleet must have turned the memory of many a classmate back to our tenth reunion in June, 1924.

King, then a captain, was our host at the submarine base at New London, and he provided the four submarines which took us out for an undersea ride in Long Island Sound. Your Secretary, who had a special reason for remembering that trip, as does Alden H. Waitt, now a Lieutenant Colonel in the Army, thumbed the class files and found a letter from Admiral King which contained this paragraph: "We are very glad that you enjoyed your visit and feel that our efforts are amply repaid by the knowledge of the Navy acquired by such a representative and influential body of citizens as the Class of 1914, M.I.T." — Admiral King, '14 salutes you, and in whatever humble task each of us finds himself, he will not let you down!

That tenth reunion also brings back memories of the days when Porter Adams was in the full vigor of health. It was he who arranged the negotiations with the Navy which led up to this famous submarine trip. Your Secretary is very happy to report that, although still confined to his house, Porter is considerably improved and has regained much of his

old-time pep.

Norman MacLeod was re-elected a director of the National Association of Manufacturers at the annual meeting held in New York the first week in December. Jim Reber and your Secretary also attended these meetings. — On the evening of December 4 the Technology Club of New York had its fall smoker. As there were several classmates in New York attending the National Association of Manufacturers meeting and others, we met at the Club for dinner and attended the smoker later. Present were: Jim Reber from Auburn, N.Y.; Art Peaslee from Hartford, Conn.; Bert Hadley from Bridgeport, Conn.; and your Secretary from Cambridge, Mass. Charlie Fiske joined us, too. At the last minute Ross Dickson, who had planned to be present, had to go home because of an attack of the grippe, and unfortunately was confined to the house for a number of days. J. H. Zimmerman '23, who was made an honorary member of the Class at our fifteen-year reunion, also joined us.

Dinney Chatfield has been exceedingly busy at the United Aircraft Corporation in his new assignment as secretary of the corporation. With the enormous expansion that has taken place at United Aircraft, the changes in corporate organization have been many, and it is understood

that Dinney has a real, man-size job on his hands. - H. C. Klipstein would like to have all '14 men going to Florida know that he operates apartments in Fort Lauderdale and would welcome the opportunity to make arrangements for any classmate. E. C. Wente, who is with the Bell Telephone Laboratories, is continuing his sound-recording activities with his usual vigor and has been granted another patent in the field. Perhaps at our next reunion Herman Affel, who has been our class movie photographer, will be able to induce Wente to add sound to the pictures. - H. B. RICHMOND, Secretary, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, Assistant Socretary, 1775 Broadway, New York, N.Y.

1915

When we planned our Boston class dinner at Walker Memorial on December 9, we didn't know, of course, that we would be competing with a new war. Despite the first Boston air alarm that day, twenty-two men attended for our usual jolly evening. We had no speakers or entertainment. We simply sat around and visited for old times' sake. Significant commentary on the history-making period we are living in is the fact that we ended the Class dinner by listening to the broadcast of President Roosevelt's speech and then rose for the national anthem.

Long distance honors went to John Dalton from Lawrence and Chet Runels from Lowell. Stanley Baxter, who has just returned to live in Boston, gave us an illuminating and interesting questionand-answer description of his twenty-five years' experience in South America. Felix J. Conti'34 was our guest. He was introduced by Henry Sheils. Felix said his own Class had never run a dinner, and he wanted to see what a class dinner was like. We were glad to have Felix with us and hope he will join us at some of the other class parties. These men made the evening a success: Bert Adams, Roland Baldrey, Stan Baxter, John Dalton, Abe Hamburg, Leslie Heath, Horatio Lamson, Frank Murphy, Johnnie O'Brien, Wally Pike, Pirate George Rooney, Chet Runels, Frank Scully, Henry Sheils, Jay Sindler 17, Ed Sullivan, Bob Warren, Fred Waters, Easty Weaver, Carl Wood, and the Secretary

If the following men had come as planned instead of having been called away at the last minute, mostly on government work, we would have had a record attendance and a hilarious evening: Sam Berkowitz from New York, Bill Brackett, Whit Brown, Harold Colby, Marshall Dalton, Reggie Foster, Alfred Hall, Loring Hayward, Weare Howlett, Archie Morrison, Harry Murphy, Ercell Teeson, Max Woythaler, and Louis Young. - Next month I hope to give you a report of the New York class dinner

held in January.

Gabe and Mrs. Hilton announced the marriage of their daughter Muriel to Frederick Henry Buehl, Jr., on Saturday, December 13, at East Aurora, N.Y. To the young couple and their parents go the congratulations and best wishes of the

Here are excerpts from some of the letters I have received recently. John Homan wrote: "I am glad to hear from you and will make every effort to attend some of our future get-togethers."—Chauncey Durkee: "How about another get-together in New York soon?"—Gardiner Wilson: "Keep up the good work. I appreciate the difficulties of your job, since I, as secretary of the Technology Club of Central Pennsylvania, am in somewhat the same position. Stanley Osborn: "I am still state commissioner of health for Connecticut.' Loring Hall: "I am glad to help you with my modest dues and hope you don't have a deficit. The best of luck." — Harry Murphy: "I trust the enclosed check will alleviate the strain on the class treasury a little. If I can get untangled from priorities, I shall certainly be at the next

Boston party. From Philadelphia, Herb Anderson wrote: "I'll be glad to see you soon. We had a fine meeting of the Technology Club of Philadelphia recently. There were 154 present, including our classmates Bailey, Daley, Guthrie, Haslam, Gene Place, Schneider, Stetson, and Whiting." Frank Buckley: "In answer to your special appeal, I am sending my check for dues with my very best regards." — Bill Brackett: "There is nothing very colorful to write about myself, except that I have a marvelous nine-months-old granddaughter. I am relieved to know that you are not young enough to attract her, you - Frank Coburn has been stasheik!" tioned at the Yankee Springs project, Middleville, Mich., for some time. Everett Brigham sent a generous check to the Alumni Fund and one for class dues. He promised to attend the next New York class party. — I recently spent a pleasant evening with Barbara and Virginia Thomas, who are always interested in knowing what is going on among our classmates.

E. C. Walker writes me: "I was really moved by your appeal, knowing full well what a tough job it is to be a class treasurer." Speedy Swift writes from Windy Acres, N.H.: "Here's your check. I should like to sign you up for my 1942 campaign for senator. One who has the oily delivery you've got would be of great help to me in my campaign. I am a member of the New Hampshire State Council for Defense and had to make a speech on the same day the Alumni Council met.'

From Allen Abrams came: "It's a long time since I saw you. Art Ball came up to see me several weeks ago. As you know, he is with the Walt Disney studios in Hollywood. I understand that Frank Hall has retired on a ranch in Texas. My best to you and any classmates you meet."

George Easter writes: "There has been no news since the note Ben Neal took back last summer. I still have one son in Oberlin College and one in Kenyon College, so I am one jump ahead of the income tax collector; I'm broke already.

I'd be glad to see any '15 men wandering in Niagara Falls if they will call me at the Research Carborundum Company. Did you get the story of Barney Field's accident? Somebody hit his car side-on while he was driving to lunch. After a long spell in the hospital, he now looks fine again." We are all sorry to hear about Field's accident and sincerely hope that

he has completely recovered.

A note from W. C. Whitman reads: "I think the Class is worth the dues, no kidding. How would you like to be in the import business these days? I used to think it was tough to dope the foreign commodity market and the foreign exchange. Well, now we don't have to worry about foreign exchange. We have all the gold in this country, and they are only too glad to sell in dollars. Just pic-ture me in your worst nightmare and you have the situation.'

Sol Schneider of Philadelphia breaks the ice: "This is my first attempt to 'Help Azel.' I shall be glad to see you when you are in town. Give me a call either at the lab or at home, and we shall hoist a cheer or two. Soon after I saw you last May, I was in New York and stopped in to see Ralph Hart. He certainly treated me

royally.

Grev Haslam penciled on the back of the dues appeal: "Your personal letter would wring tears from a stone, a dollar from a stoney. I have been helping some refugee kids, and the end isn't in sight. I hope the Class will come to the rescue of the Haslams when, as, and if. I'm very busy preparing boys to go to M.I.T. My goal is ten a class; at present we average three. My only distinction of the moment is that I am president of the County Day Schools' Headmasters' Association, which has accepted the invitation of the Institute to hold our annual convention

for 1942 at M.I.T. on June 24 to 27."
Phil Alger's letter reads: "Your note was welcome even though it contained a bill. Here in Schenectady we are very busy trying to produce at double our previous high rate, with many new products and new buildings to develop. My daughter Augusta is now a technical employee of the tube department of the General Electric here. She was graduated from Radcliffe College in 1940 and spent a year as a secretary at M.I.T. My oldest son, John, is now thinking of entering the Institute in the Class of 1949. I hope you can join me at his graduation." Shortly after this letter came Phil's annual Christmas card. It is a four-page folder with pictures of Phil's family and his summer place, and an appropriate Christmas poem - all very original and unusual.

Attached to the letter that Alfred Clarke sent me was a circular from the Omaha Chamber of Commerce, asking for new members. Alfred is president and has a fine picture of himself on the corner of this clever and original mailing piece. He writes: "Attached is a check for dues, or whatever the class treasurer may care to call it. The Omaha Chamber of Commerce is an organization of three thousand members. It keeps busy looking after

the interests of the city and surrounding territory. - In April, our only son, Dick, was married to Elizabeth Oakes and is residing in Minneapolis where he is working for the Bemis Brothers Bag

Company.

Some notes on the margin of my letter were made by Ralph Curtis when he mailed his check. - An interesting letter comes from Doug Baker who is back in the States. He tells us briefly of his exciting experiences: "You may have noted from my letterhead that I am back in the United States. I arrived here at the end of July from Budapest, via Cairo and Capetown. It took about three months to make the trip, but a considerable portion of that time was spent in waiting at various places in order to get to the next place on the route. Before that I spent about a year in the Balkans with headquarters in Budapest, making trips to Belgrade and Bucharest. Toward the end of my stay things became a bit difficult.

'The field of my supervisory activities there became more and more reduced and the supervision less and less effective. The roundabout journey home was just one of those things that happen nowadays. There seemed to be difficulties about getting a visa for the journey across Austria to Switzerland, and the other route was the alternative."

Ken Johnson amuses us: "Thanks for personal note about old friends. I wish I might stutter on the zeros on the enclosed check, but if I did it might bounce. My present status: age 47; one wife; one son, twenty-one; three or four teeth God gave me and several more the dentist thought otherwise about; a sunken chest; too much lard for two-pant suits; health fair, almost temperate. Your postage-paid, business reply envelope deserves proper recognition, since with advancing age the lack of a stamp sometimes results in procrastination. My kindest, Azel, and admiration for the splendid job you have rendered your Class' for so many

To these men, and to the many others who have paid their class dues and written me news for the class notes, go my thanks and appreciation for your loyal spirit in helping '15. To the many classmates and their families who remembered me with attractive Christmas cards go my thanks with a warm feeling for the fine old friendships we have enjoyed over these many years. These are the things that really "help Azel." — Azel W. MACK, Secretary, 40 St. Paul Street, Brookline, Mass.

1917

We have a memorandum from Charlie Locke '96 saying that Frank S. Small, formerly mill superintendent for IXL Mining Company, Balete, Masbate, Philippine Islands, is now serving in the same capacity for the Balatoc Mining Company at Baguio in the Philippines. One or two others in the Class, including Frank Conaty, are in the Philippine area, and still others are in Hawaii or with the Army and Navy in the Pacific.

From the November Journal of School Health, we note that Clair Turner has been elected to the position of presidentelect of the American School Health Association. The account sets forth Professor Turner's bona fides as follows: A Fellow of the American Public Health Association, Fellow of the American School Health Association, Dr. Turner has been Chairman of the Health Education Section of the American Public Health Association and a Vice-President, representing the Division of Health Education, of the American Association for Health, Physical Education, and Recreation. Trustee of Bates College, Member American Academy of Physical Education, Phi Beta Kappa, Author of several texts on Hygiene and on the Teaching of Hygiene, and of numerous articles in the field of Hygiene. . . ."

The college press service of the General Electric Company notes: "Irving C. Eaton, assistant engineer of the General Electric Works laboratory at Bridgeport, Conn., since 1930, has been appointed engineer. . . . Mr. Eaton has for many years been engaged in technical and executive positions in the chemical and electrical industries. He was at one time assistant to the superintendent of the Union Carbide Company of Canada, Ltd., at Welland, Ontario; assistant su-perintendent of Bird and Son, Inc., of Phillipsdale, R.I., and Works Manager of the Sheet Division of the Fiberloid Corporation, now Monsanto Chemical Co., at Indian Orchard, Mass., prior to his connection with General Electric."

C. C. Adams dropped in to say hello in the fall and to report that he is now chemist for Fruit of the Loom, Inc., at the finishing plant in Pontiac, R.I. He has been with them for four years, after having previously spent eight years learning the intricate process details of the industry. - In seeking material for his edition of these notes, Ted Bernard wrote to Leon McGrady. Mac scratched a hasty note a month or so later saying he had been camping right in Rochester for the last eight months, fending off Office of Pro-

duction Management regulations. A group of native and naturalized Bostonians gathered early in December to consider ways and means of lending assistance to Chairman McNeill in preparation for the reunion. Those present were: Beaver, Bernard, Crosby, Crowell, Doherty, Dunham, Ferretti, Fine, Ford, French, Gargan, Gramstorff, Hall, Hill, Hulburd, Lobdell, Lunn, Maeder, Stearns, Stevens, Strout, Tapley, Tuttle, H. L. Wood, W. C. Wood, Woodward, and Wyman. The meeting was planned and headed by Henry Strout, formerly of the West Coast and now in charge of New England distribution for the California Packing and Sales Company. The effect of his breezy, capable western style is bound to be seen in subsequent class activities in the northeast. Lucius Tuttle Hill acted as secretary of the meeting. - A wire was sent to Ray Brooks (Wayside, Brantwood, Summit, N.J.), who was at that time in the hospital with a recurrence of the old trouble with his back.

Carl Dean of the Montsanto Chemical Company of St. Louis was one of the impatient pre-Christmas eastbound travelers on the New York Central's crack Missourian when it was ceremoniously halted at a water tank in the Mohawk Valley to take aboard another member of the Class. Further railroad news of the week before Christmas is that Dutch Neumann did get space from Boston on the New England States, so that he and his son Gordon, a senior at the Institute, were able to leave for Iowa several days before the official beginning of the Institute's vacation period.

No changes have been made so far in the reunion plans, although East Machias, Maine, has been proposed as a safer place than New London. It seems probable at this time that our gathering can and should be held and that every effort should be made to obtain a full attendance. — RAYMOND STEVENS, Secretary, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, Assistant Secretary, Phillips Exeter Academy, Exeter, N.H.

1919

Your Secretary is sure that the members of the Class, many of whom still have vivid memories of the last struggle, will serve in one way or another in the defense of this country in the present emergency to insure total victory. — George A. Irwin, a major in the Quartermaster Corps of the Army, writes from Mitchel Field, N.Y., where he is now located. His home address is 15 Stratford Road, Andover, Mass. He has three girls and two boys, and his hobbies were golf, bowling, and chess. He says he expects plenty of traveling soon.

ing soon.

Arthur R. Ford has moved from Minneapolis, Minn., to 419 Croyden Road, Upper Darby, Pa. — Dudley B. Murphy has moved from Pacific Palisades, Calif., to 1650 Amalfi Drive, Santa Monica, Calif. Herman A. Herzog writes from 505 South Maple Avenue, Glen Rock, N.J., where he is in the leather business — hides and skins. He has a family of two girls and one boy, and he gardens for recreation. — Hosmer C. Jones, 90 White Avenue, West Hartford, Conn., is an industrial arts teacher. He has a son twenty-two years old and a daughter twenty-one. He drives from Maine to Baltimore several times a year and sails a boat as a hobby.

Stuart J. Hayes is a fiber expert for the Ludlow Manufacturing and Sales Company in Boston, and resides at 68 East Elm Avenue, Wollaston, Mass. He has twin daughters, fifteen years old, and a younger daughter, seven. He gardens for recreation and travels between mills -Boston to Pennsylvania and Delaware. C. M. Herrick is district manager of the Georgia Power Company and resides at 1109 North Monroe Street, Albany, Ga. He is married, does not travel extensively, and indulges in sports for recreation. He writes: "I have lived in the South since 1921. I married Lunelle Pendergrast Parrish, a native Georgian, in 1927. I've been in Albany, Ga., since October 1, 1926. We have a fine, progressive, growing town.

Mrs. C. L. Higgins writes from 249 Walnut Street, Bloomfield, N.J., that she has three boys and that her occupation is preparing them for M.I.T. — Richard S. Holmgren is chief engineer of the New Hampshire Water Resources Board and resides at 33 Ridge Road, Concord, N.H. He is married and has two sons and one daughter. He sails and skis for hobbies and has taken the Caribbean cruise and done some skating in Quebec. Holmgren attended the Alumni Day banquet in June

June. L. A. Jackson, manager of the Little Rock Municipal Water Works, lives at 1600 Gaines Street, Little Rock, Ark. He has two girls, fifteen and eleven. Jackson writes: "I notice from your address that you are associated with a company we have had dealings with the past few months. If your travel should ever bring you to Arkansas, I should be delighted to have you call on me." Your Secretary looks forward to seeing Jackson when he is in the vicinity of Little Rock. -- Washington Alumni inspected the new Washington National Airport at Gravelly Point, Va., on Friday, September 26. Classmates present were Louis J. Grayson, Edward E. Saunders, Merrit P. Smith, and Donald C. Stockbarger.

Your Secretary has received a letter from Charles E Locke'96, Alumni Secretary, in reply to questions regarding the Class gift at the twenty-five-year reunion. Further information about this will be forthcoming in later columns. — EUGENE R. SMOLEY, Secretary, Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. McCreer, Assistant Secretary, 131 Clarendon Street, Boston,

Mass.

1920

I am able to report a very pleasant holiday get-together with Mr. and Mrs. Myron Harrison Clark and their two fine youngsters. Gibbs and Perk Bugbee were also there. Buck is certainly in the bucks, as evidenced by the fact that he presented the family with a fine extra automobile for Christmas. Other successes I am pleased to report are the promotion of Pete Lavedan to president of the Liquid Carbonic Corporation in New York and the fact that Herb Dorr has been put in charge of the big new bomber plant in Kansas City. Another advancement of note is that of Irwin L. Moore, who has been made a director of the Worcester County Electric Company. Moore has been with the New England Power System for twenty-one years, and early this fall he was made president of the New England Power Association.

I received an exceedingly attractive and clever Christmas card from K. B. White announcing the location of his new home, "Loss Vineyard," at 1300 Manhattan Avenue, Union City, N.J.—Edward R. Cruise was married on November 12 to Helen J. O'Leary at Winthrop, Mass., and the couple are now at home at 68 Washington Avenue, Win-

throp.

Henry Erickson is among those who have gone to Washington, D.C. His ad-

dress is 3217 Connecticut Avenue. Clyde K. Hall is now a lieutenant at the Army Airways Station at Miami Municipal Airport, Hialeah, Fla. John I. Hale is a captain in the Navy and supervisor of shipbuilding at 11 Broadway, New York. Toots Kinghorn's new address is Frogtown Road, Walton, Ky. As far as I know, he is still with the local electric railway system at Covington. Fraser Moffat is now living in Darien, Conn. John Nalle has left Waterbury and now lives at 434 State Street, Lancaster, Pa. Phil Somerby is living at 25 Johnson Avenue, Winthrop, Mass. — HAROLD BUGBEE, Secretary, 7 Dartmouth Street, Winchester, Mass.

1921

William R. Hainsworth, V, vice-president in charge of engineering for Servel, Inc., was elected president of the American Society of Refrigerating Engineers at the annual meeting of that organization in St. Louis. Bill has been engaged in refrigeration research since leaving the Institute. — Edward G. Sparrow, VI, formerly director of the American Red Cross with headquarters in Marseilles, France, is now in New York City, where he is making his home at 41 East 68th Street.

Ernest R. Gordon, XII, has written an interesting account of his new work in Africa. "At the end of June, I took an indefinite leave of absence from my duties in Mexico and two weeks later was on my way across the Atlantic with the Gold Coast my destination. I arrived here at the end of August and immediately started on my new duties as general manager of the Gold Coast Banket Areas, Ltd. We are mining and milling about 400 tons of medium-grade gold ore daily, and general operations do not differ much from similar operations in Mexico. I have a good staff and associates. The major recreations are golf, tennis, and cricket, which last will soon give way to football. The climate, while supposedly bad, has been better than advertised. The thermometer rarely reaches 95 degrees and at night almost always falls to the 70's. As I left my family in El Paso, any and all news will be most welcome." Ernie's address is Post Office Box 10, Aboso, Gold Coast Colony, West Africa.

Lewis A. Nickerson, II, has been promoted to the rank of colonel in the Ordnance Department of the Army. Charles L. Pool, XI, has been commissioned a lieutenant commander in the Public Works Department of the Navy and is located at the Naval Operating Base, Norfolk, Va. — David O. Woodbury, VI-A, whose new book was listed fourth in a recent Herald Tribune "Guide to the Outstanding Fall Books," has moved to Tuckahoe, N.Y. Dave writes: "My new book, The Colorado Conquest, has done very well indeed. It received a front page review in the Herald Tribune Sunday book section and a full page in the Times book review. [Also a favorable write-up appeared in the Trend of Affairs of the December Review.] The Colorado Conquest is about to go into a second edition. The publicity, resulting in several

radio appearances on WGY, Schenectady, and WOXR, New York, and a steadily increasing number of talks before various clubs, has led me to sign with the Getts Lecture Agency as a regular lecturer. The main news, however, has been my ap-pointment as official biographer of the former M.I.T. President, Elihu Thomson, under the sponsorship of Mrs. Thomson and the American Philosophical Society. The book is to be published by Houghton Mifflin Company, Boston, and will take about a year to write. Dugald C. Jackson, Professor Emeritus at the Institute, and the General Electric Company are aiding me. I am working on several articles for the Reader's Digest and have lately turned out a movie scenario on a war subject, which is now on its way to Hollywood. I still have time to revamp my photography setup with a new camera and take quite a few pictures."

S. Paul Johnston, II, also has a best seller on the stands. It is *Flying Fleets*, a graphic history of United States naval aviation from Glenn Curtiss to the latest dive bomber. Paul is in Washington with the National Advisory Committee for Aeronautics and holds a commission as a lieutenant commander in the Naval Reserve. - Edgar E. Hume is another writer whose work has recently been mentioned in the press. He has just had published a volume entitled General Washington's Correspondence Concerning the Society of the Cincinnati. Edgar is a lieutenant colonel, stationed at the United States Army Medical Field Service School, Carlisle, Pa.

These new addresses have been received: Adolph H. Aronson, V, Aronson-Cohen, Inc., 441 Broadway, New York, N.Y.; William E. Caisse, I, 1223 W Street, Southwest, Washington, D.C.; Andrew Deane, XV, 220 South 5th Street, Reading, Pa.; Louis B. Dennett, XV, "Ducilo" A. Productora de Rayon, Beraztégui FCS, Argentina, S.A.; Roderick K. Eskew, X and X-A, 636 Willow Grove Avenue, Glenside, Pa.; Dwight V. Gregory, V, 5020 Dermond Road, Drexel Hill, Pa.; Walter C. Hagerton, VI, 110 Third Street, Northeast, Washington, D.C.; Major LeRoy M. Hersum, I, 172 Cotton Street, Newton, Mass.; Alexander J. LaPointe, X, Fox and Hounds Inn, Bloomfield Hills, Mich.; James LeGrand, I, 1453 Mars Avenue, Lakewood, Ohio. Joseph C. Morrell, II, 18 Ridgeway Circle, White Plains, N.Y.; Sherman E.

Nichols, XV, 1145 Herschel Avenue, Cincinnati, Ohio; Colonel Lewis A. Nickerson, II, 640 West 40th Street, Baltimore, Md.; Herbert K. Nock, VI-A, 168 Humphrey Street, Marblehead, Mass.; Raymond E. Patten, II, Chestnut Hill, Wilton, Conn.; Captain Victor S. Phaneuf, II, Fort Ethan Allen, Vt.; Hazen C. Pratt, II, 760 Campbell Avenue, Detroit, Mich.; Herman B. Thompson, I, Woods Brothers Construction Company, 504 South 18th Street, Omaha, Neb.; Sidney Turkel, V, Scott and Whiteaker, Inc., 3100 North-west 27th Avenue, Miami, Fla.

The Class has contributed twenty-five dollars in response to the annual appeal of the Alumni Athletic Fund. Please contribute a note to the undersigned. — RAYMOND A. St. LAURENT, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, Assistant Secretary, International Tele-phone and Radio Manufacturing Corporation, 67 Broad Street, New York, N.Y.

Many of our classmates are on active duty, and more will be called to the colors besides those who have the tremendous job of industrial war preparation, in which men of our age and training are bound to take an important part. We shall try to continue the Review notes as best we can, however, and we urge our classmates who are in the armed forces, or are otherwise entering specifically into the defense program, to try to drop us a line occasionally to tell us their where-abouts. — Alan C. Johnston has just done this, and we thank him for letting us know that he is a captain in the Ordnance Department stationed at the Elwood Ordnance Plant, Joliet, Ill. Formerly he was in Washington. Captain Johnston has retained his interest in the ordnance reserve ever since he was graduated. He was called to active duty in August, 1940.

On November 4, a farewell dinner was tendered in Boston to Abraham G. Silverman, a major, who left the next day for San Francisco en route to Manila. James Nesmith, 2d, formerly assistant engineer of the Public Service Electric and Gas Company in Newark, N.J., has been called to active service in the antiaircraft division of the Coast Artillery.

The march of time continues in spite of the war, and we have word that on September 28 Ferris Briggs in Scarsdale, N.Y., welcomed a daughter, Marcia, into the family composed of Mr. and Mrs. Briggs, Peter, and Kippy. — On a recent trip to California, Bill Mueser ran into Norman L. Apollonio, who lives at Camino, Calif., where he has a pear ranch. He supplements his income by teaching chemistry at the Sacramento High School. Bill saw Don H. McCreery in Los Angeles. Don is now with the engineering firm of Leeds, Hill, Barnard and Jewett and formerly had been in the contracting business. He is senior officer in charge of design for the cantonment being built at San Luis Obispo, Calif. This is the second army building project in which Don has taken an active part.

Heinie Horn, our Class President, who has been living in West Orange, N.J., left suddenly for Washington, D.C., where he has been engaged as an analyst in the Office of Production Management. Heinie says that all new men are given a very thorough training in the O.P.M. setup, and that there is a very well-organized background to the O.P.M. activities.

The reunion plans will remain in status quo until the future looks brighter. Graduation at M.I.T. has been moved forward to April 27, according to advice just received from Yard Chittick, and several of the men have written in asking if we can go ahead with definite plans at this time. The reunion committee will meet presently to discuss further steps. — CLAYTON

D. GROVER, Secretary, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, Assistant Secretary, 77 Franklin Street, Boston, Mass.

During the army maneuvers in North Carolina last November the first parch-ment citation to be issued to troops from Camp Edwards, Mass., was received by Company A, 57th Signal Batallion "for meritorious service." The company had been in that area since August to establish telephone and telegraph lines for the army operations. Oscar L. Perkins is the commander of this company. Major Sidney Cook, Boston Herald staff reporter, praises Captain Perkins' work in developing effective and well-trained crews from a force composed largely of green men.

Prentiss B. Alger was sworn in on November 27 as a lieutenant in the United States Naval Reserve. Since 1934 he had been with the alcohol tax unit of the United States Bureau of Internal Revenue and made his home in Newtonville. His new duties are those of radio physicist in connection with the Radar program under the cognizance of the United States Bureau of Aeronautics. Don't ask me what the Radar program is. That's what it was called by the Naval Reserve public relations officer whose official release furnished the above information.

Many members of the Class are in the armed services. From now on it will probably be good policy not to tell in these notes or elsewhere in print where these men are moving. But we'll be interested to record any such movements and changes that can be mentioned without revealing fundamental military operations.

I dropped in on Pete Pratt the other day to confirm personally the information reported in last month's notes. Pete has his family with him in Chicago, where he is a major and executive provost mar-

shal, Sixth Corps Area general staff. The restrictions placed by many countries on sending out money has made it impossible for many Alumni living outside the United States to contribute to the Alumni Fund. As subscriptions to The Review are a part of the fund, The Review has invited those who would like to continue to receive the magazine, and yet cannot transmit funds, to send in a card saying so. With one such card Chick Kane'24, Fund Director, received an interesting letter from John W. Voelcker, from which the following is quoted: "I should not like to return the green card without saying how very much I appreciate the offer and opportunity of keeping in touch with M.I.T. Perhaps now more than ever have I looked back with many happy memories to 1922-1925. The Review, however, has not been my sole reminder. I still use daily a razor in its original Tech-emblazoned case. Who said American products were not made to last? At any rate your kindness and friendship needs no action on my part, and the most gratifying remembrance has come with the war.

More than one of my Boston friends have offered unconditional hospitality to my children. I need not say here which way this difficult decision went, but the offers were typical of all I had experienced in your country. I am once again in the army, serving in the Royal Engineers, and am at present a staff captain in the directorate of transportation. In general, I follow my profession of electrical HORATIO L. BOND, Secengineering." — HORATIO L. BOND, Secretary, 457 Washington Street, Braintree, Mass., JOHN M. KECK, Assistant Secretary 207 Bloomfield Avenue, Bloomfield, N.J.

1924

A newsy letter from Paul Schreiber came from 3907 Huntington Street, Northwest, Washington, D.C. Paul wrote: "The war sort of stirred things up a bit and caused many changes. That's why I'm in Washington right now - in the Office of the Quartermaster General, or, in local alphabetical language, O.Q.M.G. I'm a technical adviser for rubber and chemical products used in the Quartermaster Corps. The work is very interesting, involving work on rubber products, chiefly, but also on paints, oils,

soaps, inks, and so on.
"I have been here since last April and have run into quite a few '24 men, among whom are Clarence Chaffee, Lyle Clough, John Fitch, Henry Rau, and Felix Stapleton. Before I came here I was with the Hartford Rayon Corporation in Rocky Hill, Conn., for eight and a half years. In Hartford I used to run into Elbert Brown rather frequently. He is with the Connecticut Valley Power Exchange. We have two children now. Carolyn Rae was seven in December, and Raymond Paul, Jr., one and one-half years old then. Both are quite active and enjoy Washington's many parks and amusements." - Paul's letter should set a good example for other members of the Class.

We hear via the Alumni Office that Myron Freeman has purchased a new house at 24 Newbury Park, Needham, Mass. Since November, 1940, he has been associated with the Stone and Webster Engineering Corporation. Charlie Fahrenbach is now living at 142 Grant Street, Denver. Bill Parker's most recent address is 224 Liliuokalani Avenue, Honolulu. He should be able to send us a most interesting letter right now. Francis A. Barrett, General Secretary, 50

Oliver Street, Boston, Mass.

1925

Remember, if you want to see your name in print, all you have to do is send in a very modest amount of news. After all, if you don't write once in a while, we have only negative evidence that you are still alive. Having got that off my chest, I give you the news. — Frank Klein writes as follows: "You will doubtless be surprised to hear that I left the Glenn L. Martin Company on November 15 to accept a position as sales engineer, engineering division, sales department, Standard Oil Company of New Jersey, 26 Broadway, New York. The work will be

extremely interesting to me, as it pertains

to aviation products.

"Although I left many friends in Baltimore, I have a great many here, both M.I.T. men and others I had contact with when on duty with the Air Corps at Wright Field. I was pleasantly surprised to run into Dave Shepard'26, whom I hadn't seen since graduation. His foreign service didn't seem to stunt his growth at all! I hope I can hear him play his banjo again. My boss is George Freyermuth '28. All I can say about him now is that he's so smart I can't put anything over on him. I've sold my house at Towson, Md., and bought a house at Mountain Lakes, N.J. We moved on January 3, and our address is 12 Overlook Road. Mountain Lakes appears to be a combination summer and winter resort, so I'm sure we'll be happy here." Congratulations, Frank, on your new job. Surely you can do as much for the success of the United States in the new job as in the former one. Both are truly important in these days.

From the latest batch of address changes we obtain the following bits of information: Charles Cooper, X, is now located at the E. I. du Pont de Nemours experimental station at Wilmington, Del. Since his previous address was Newark, Del., this is probably not a change of employment but simply a change in location. I pass it along for the benefit of his friends in Course X and

other Courses.

Myron Doucette, a major, has returned from duty in Washington, D.C., to his home at 66 Spruce Avenue, Floral Park, Long Island. With the developments that have taken place since the date of this change (November 6), I can't hold out any assurance that he'll be in Long Island long, so if you want to write him there you had better do it at once.

Wallace E. Richmond, formerly of Andover, Mass., and an assistant in research at Harvard University, according to the 1940 "Register of Former Stu-dents," is now located at 2333 South Nash Street, Arlington, Va. According to the notice, he is now to be known as Dr. Richmond, although information is lacking as to the nature of the degree. Probably it is a Ph.D. This will have to do unless he objects.

And now, to paraphrase a famous Roman, the Axis must be destroyed. Let's all buckle down and do our share, in either civilian or military life, to bring this destruction about. - Hollis F. WARE, General Secretary, 3 Aquavia Road, Medford, Mass. F. Leroy Foster, Assistant Secretary, Room 7-121, M.I.T.,

Cambridge, Mass.

1926

Among the members of our Class who have taken active part in army maneuvers in North Carolina are Robert C. Dean and A. W. K. Billings, Jr., both majors of the 26th Division. In a story of the maneuvers, the Boston Globe noted that Ken Billings, acting as intelligence officer, was taken prisoner while making a reconnaissance. - Jim Offut, who is with the United States Gypsum Company in Chicago, stopped at the office recently on a business trip to Boston and the Institute

Louis Berubé is assistant director of the social-economic service of the College of Fisheries, Ste. Anne de la Pocatiere, Quebec. He is working among the farmers and fishermen of Lower Quebec and the Gaspé Peninsula. - John R. Oakley has been transferred from Akron to the Goodyear plant in Brazil, where he will have charge of the technical service division. He expects to remain there for at least four years.

Theodor Muller now gives his address as Dorothy Draper, Inc., New York. William J. Murphy, a commander, was recently assigned to the United States Naval Mission to Peru, after a period of service at Cavite in the Philippines. -James R. Killian, Jr., General Secretary, Room 3-208, M.I.T., Cambridge, Mass.

Winthrop T. Noyes, VI-A, of Newburyport, Mass., died on October 30. Bill Cullinan, VI, is now stationed at the Custom House in Boston with the Civil Aeronautics Administration. The Hygrade Sylvania Corporation transferred Gerry Morse, XVI, from the home plant in Salem, Mass., to the New York office on 500 Fifth Avenue. - Frances Swarti, IV, now Mrs. Nalbro Frazier, has changed her residence from New York to Pittsburgh.

Recently announced was the engagement of Claire D. Lynch of Medford, Mass., to Tom Hickey, XV. Tom is a patent examiner at the United States Patent Office in Washington. - November 21 was the wedding day of Dave Wells, XV, to Jean Kiley of Boston. Dave and his bride are living in St. Louis. To Frances, Tom, and Dave are extended the best wishes of '30.

Coincidentally, the two communications your Secretary has received from classmates both come from the Pacific war zone and were written before the outbreak of hostilities. The first is a brief word from George Barker, V, from Honolulu, where he was enjoying a combined business and pleasure trip. 'It is a marvelous country,' said George. Jack Bennett, II, sends his presidential greetings to your Secretary and the Class from Australia. Jack recommends the Australian Alps for skiing, but he isn't so enthusiastic about his monthly ration of gasoline, which he calls "petrol."

He wrote in part, "The war has brought about many changes in all aspects of life down here, these changes having been especially marked during the last twelve months. There has been a tremendous growth in wartime production of all sorts, and tremendous strides have been made toward industrializing the country. Australia, because of its location, is becoming more and more the supply point for Empire needs all around the Indian Ocean. With increasing tension in the north, Pacific travelers from India, Malaya, and the Dutch East Indies are going to the United States via Australia, assisted greatly by the good air service be-

tween Singapore and Sydney, where they can pick up the very modern and com-fortable Matson liners." . . . Since your Secretary's first job at the shipyard in Quincy was that of helping to make molds for the inner bottoms and deck platings of those same Matson vessels, he's glad to know they're still afloat. - Jack concluded his letter by extending to all members of the Class best wishes for 1942, in which I join him most heartily. — PARKER H. STARRATT, General Secretary, 1 Bradley Park Drive, Hingham, Mass.

Considering the speed with which recent international events have happened and how different our outlook may be by the time you read this, our past references to a reunion in June may have been premature. It is only by writing us your opinions on this subject that we can reach an intelligent decision on the ad-

visability of holding our tenth reunion. Charles E Locke'96, Alumni Secretary, sent word to us that James N. Demas has moved to the Hotel Monte Carlo, Los Mochis, Sinaloa, Mexico. His business is raising tomatoes. - Elwood Schafer sent us the following information about himself: "I was married on September 27 to the former Eileen McCloskey of West Orange, N.J. We are living in Carteret Village, Orange. I am chief development engineer of the National Union Radio Corporation, Newark, but now I'm managing a new defense plant.

The scarcity of news in this column is a reflection of the fact that you didn't write in. We all enjoy reading about the other fellow but seldom realize that he would like to know about us, too. -CLARENCE M. CHASE, JR., General Secretary, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, Assistant Secretary, Research Corporation, 137 Newbury Street, Boston, Mass.

1936

It's been a long time since we've crashed into the class notes section, and I hoped that some of you fellows might be interested enough to drop me a line and complain about it. Incidentally, I also hoped you might include a little bit of news about your whereabouts and activities. However, I've found that this system doesn't work. No letters have been forthcoming, but with the aid of the army directory, our efficient M.I.T. "Register of Former Students," and several press clippings, I have a few items about our scattered and busy Class. I did have direct word from a couple of the gang through brief notes which they attached to their Christmas cards. Bernie Gordon says that he left Harvard in June and returned to the United States Engineers at Piedmont, Mo., where a flood control dam is being erected. He has charge of the soils lab and the fill inspection. Another note came from El Koontz, who gives his new address as the University Člub, Minneapolis. El reports a new job — district manager for the same company, Reliance Electric and Engineering Company — and a wife in the spring.

And now that the subject has been brought up, I think it would be appropriate to announce a few other weddings and engagements. On September 20, Bill Fingerle was married to the former Charlotte Shearer of East Greenbush, N.Y. Bill is a radio engineer with Fred M. Link radio laboratories in New York City. On September 14, Bill Reilly joined the ranks of the benedicts, taking as his bride the former Edith Whittemore of Belmont, Mass. Russell Miller was also recently married. The bride was the former Janet Lee Parker Boyle of Reading, Mass., and the wedding took place on October 4. Russ is now employed with the Atlantic Mutual Insurance Company in Boston. On November 29, Jean Ferris and Hibbard Summersgill were married in Westfield, N.J. There is one engagement to be announced: that of Margaret C. Robinson of Stamford, Conn., to Arthur S. Nyquist. A March wedding is planned.

Perhaps the reason we haven't heard from the group is because everyone is so busy with defense work. Following is a continuation of our previous listing of those serving in the armed forces. Captain John Meeks is at the Rock Island Arsenal in Illinois. Lieutenant Mel First is with the Coast Artillery at Fort Bliss, Texas. Lieutenant Charlie Price is at the Engineers' School at Fort Belvoir, Va. John Myers has also acquired the title of lieu-tenant and is in Wilmington, N.C. Al Klemka has replaced his doctor with lieutenant and is stationed in Louisville, Ky. Lieutenant Charlie Holman is at the Alabama Ordnance Works. Captain Edward Herb is at the district engineers' office in Little Rock, Ark. Captain Al Bagnulo has been transferred from the Virgin Islands to Puerto Rico. Ensign Stanley Freedman is at the Naval Medical School in Washington, D.C. Serving on the home front are Dr. Bernard Vonnegut, who is with the Chemical Warfare Service Development Laboratory at M.I.T., and Bill Kennedy at the Curtiss-Wright Corporation plant at Columbus, Ohio.

In the light of recent war activity in the Pacific, I was interested to learn that Saul Lukofsky was in Honolulu when the fighting began. We should be interested to hear from him. Don Kenny is with the Kendall Refining Company in Bradford, Pa. In Indianapolis, we find Bob Hurst working with the Home Owners Construction Corporation. And, finally, Dana Devereux is with Emerson Engineers in New York City. - Anton E. HITTL, General Secretary, West River Road, Grand Island, N.Y. ROBERT E. SAWYER, Assistant Secretary, 35 Lawndale Street, Belmont, Mass.

1937

Our Prexy, Dave McLellan, surprised me by writing a letter from Wilmington, N.C., where he is working for the North Carolina Shipbuilding Company. As Dave put it: "I had decided last June that I would have to leave the protective custody of the United Shoe Machinery Company in the fall, so I left early to see America first. I recommend such a course to any unmarried man. If was a lot of fun. I left Boston about June 5, motored to Seattle, and then went by bus to Portland, San Francisco, and Los Angeles. There I ran into several of the boys and so stayed

for quite a while.

"John Pitkin was just completing the erection of a new home at 543 West Knightway, La Canada, so Harry Kohl and I helped him with the spade work. John, of course, true to his reputation of maneuvering others into working for him, had most of the Lockheed Aircraft Corporation's engineering force out to help him. - Duane Wood has been shifted into the industrial relations department of Lockheed. He and Alden Acker are working together. - On my way home I stopped in Chicago to see Bob Jordan. He's up to his ears in work. He's still unmarried, so he spends his spare time away from the American Metal Ware Company on recording in-struments. — After his marriage, Bill Burnet spent a week at the Watertown Arsenal and now is a full-fledged member of the armed forces."

Mac went on to praise the fine work of Walt Blake and Phil Peters as class agents for the Alumni Fund. Last year the Class made an enviable record, and believe me we're going to make it better. - The fifth reunion looms large and very near at hand. Even now big plans are being made, and although, because of the present crisis, we may not all be able to attend, we can gather locally or even in our fox holes and join in the spirit of good fellowship. Further suggestion along this line, or any line which will foster '37 spirit, will be greatly appreciated.
Further first-hand news from California

comes directly from Duane Wood, Josiah Heal, and Alden Acker. Their team letter, written by Alden, is just packed with news bits I'm sure you'll enjoy. "Joe Heal and I came to Lockheed to work almost two years ago, and Duane Wood has been here almost a year. Joe is working on final assembly problems, and Woody and I are handling engineering wage and salary administration problems for Lockheed and Vega. It is a very busy

plant and a busy industry.

"Archie Ahmadjian, XV, preceded us here by about a year and stayed until three or four months ago, when he left to become a first lieutenant in the 47th Engineers, United States Army. Sometime in November he was married to Louise Imhoff of Pasadena. - Joe Heal was married in Chicago and is the proud dad of a young lady about a year and a half old. - I was married to Winifred Huntington in Cincinnati about two years ago. - Duane lives in palatial fashion with four other Lockheed men, two of whom are also from M.I.T. John Glacken'38 and Ken Comsey'39. Bill Mullen'36 is also one of the Lockheed boys we see occasionally. He was

married recently.
"Bill Wold, XVI, an assistant project engineer at the Consolidated Aircraft Corporation arrives in Los Angeles occasionally, always with a bevy of beautiful San Diego belles. His arrival is the sign for a lively get-together of the local

Alumni. Bill managed to wangle a ride back East recently via a PBY flying boat. He returned on a commercial transport by way of Woody's establishment in Burbank. — We are all enjoying the many avocational activities here. These include riding, swimming, scenic attractions, skiing (for Woody and the boys who are rabid fans), and flying. Woody and I bought a 1941 Piper cub last July and have been building up flying time quite rapidly since then. We both feel elated about getting our private licenses. Winifred also has quite a few solo hours and is getting on toward her license. We have quite frequently talked of the possibility of a flying vacation next summer to coincide with our fifth-year class reunion.

"We recently received a wedding announcement from Charlie Ryan, who worked in Washington for a while and who is now successfully concealing both his location and his professional connection from old friends who would like to correspond with him. The same accusation goes for about 450 other graduates of '37 whose names have failed to appear in our class notes. Johnny Pitkin is a group engineer at Lockheed. His new home in a fashionable Los Angeles suburb is so large that he is thinking of training guides to show people through. While Dave McLellan was here, Marion Pitkin served a fine dinner to Dave, Johnny, Duane, and Harry Kohl, who is also in Lockheed's engineering department.

Al Swift, VI-A, was working for the Public Service Electric and Gas Company of New Jersey as a distribution engineer when the Army got him. He was first stationed at the Tallahassee Air Base in Florida. He has recently been transferred to Cambridge, where he will study at Tech and Harvard for the purpose of showing the Army how to build radio aircraft detectors. Bob Fischel is in the Air Corps at Wright Field. Bob Alder is working for the Lane-Wells Company in the oil fields of Texas. Dave Hill is in the stress analysis group at Lockheed. Norm Robbins is in the engineering department of Consolidated Aircraft Corporation and is stationed as liaison engineer at the Ford Motor Company, Dearborn, Mich. Stan Zemansky is in California working for North American Aviation, Inc. Frank Maida (remember Ravelli?) was working for the National Geophysical Company in New York and Texas. Given Brewer is working in the research department at Lockheed.

"Dave Whitaker, IV-A, after working as construction engineer on the Denver munitions plant, has moved to Des Moines, Iowa, for more construction work. Before moving, he married Lois Jean Wiegardt of Denver. Dave recently had one of his beautiful color photographs used as the cover of the publication of the Mountain States Telephone and Telegraph Company. — Barney Riddell '38, XV, was selling Pliofilm for the Goodyear Tire and Rubber Company to foreign countries until the rubber shortage curtailed the Pliofilm trade. Now he is in Akron, Ohio, developing leakproof gas tanks for use in aircraft. Dana Dev-

ereux'36 came to Lockheed last year after taking a special six-week course in aircraft. He lived with Duane until about last June, when he left to work for an industrial engineering consulting firm in Galveston. Texas "

Galveston, Texas."

Richard Young tells me that he is learning how to handle fried chicken down in Birmingham, Ala., where he has taken charge of the priorities section of the Southern States Equipment Corporation. — Winthrop A. Johns, General Secretary, Route 1, Bellemead, N.J. Philip H. Peters, Assistant Secretary, 10 Babson Park Avenue, Wellesley Hills, Mass.

1938

By several roundabout and devious ways, we have learned of the whereabouts of the following class members, who should be able to furnish us with some class notes one of these days. King Coombs is now stationed at Fort Buchanan, Puerto Rico, with the 27th Engineers. Bill Roper is in New Orleans, also with the Army. Maybe he can solve the mystery of the Kearny-Gambel disappearance. Jack Chapin has also disappeared.

Bill Gibson is in the diplomatic game now. He is working for the commercial attaché at the American Embassy in Rio de Janeiro. By this time Bill has probably picked up a real South American way, having spent all of last summer skiing in Chile. — A card from Enver Muratzadi tells us he is still located in Pasadena. — Don Weir is now in the management consultant game. He is still living in Hollywood.

Jay and the new Mrs. AuWerter are out in Ohio somewhere, but beyond that we can't call it. — Dave Torrans has received his doctor's degree in chemical engineering and is now with the Hercules Powder Company. — Dale F. Morgan, General Secretary, 142 Woodland Avenue, New Rochelle, N.Y. Richard Muther, Assistant Secretary, Room 1–180, M.I.T., Cambridge, Mass.

1941

A communiqué from the marital front says that Paul Erlandson and Betsy Hague were married in Lunenburg, Mass., on December 22. Both the instigators of this column were present, with the Cambridge half as best man. The stage was set, the bridegroom was about to appear in the modest white church, when suddenly the front door burst open and the church re-sounded with a loud, "Gad, we made it." Bob Mayer and Bill Unger staggered in. Nuff said. On the same week end, Bill Schubert and Ruth Linnell Chase were married, with Reid Weedon as best man. All people mentioned thus far are to be residents of Philadelphia or vicinity for the time being.

On the train to Boston, I bumped into M. P. Moody, who had a word to say about the other '41 men at the Naval Academy: John Griffin, Ray O'Connell, Rog Blum, Camille Kosztyla, and V. F. Janulevicius. Dirk Van Dongen and Walt Threadgill are with the Dravo Corporation in Pittsburgh, while Moody is at

Lehigh, Pa., doing engineering work for the Navy. Alan Hill is in the signal corps procurement office in uptown Philadel-

phia.

The Technology Club of New York recently held a very interesting meeting with Horace Ford, Treasurer of the Institute, as the principal speaker. Mr. Ford showed films of Technology which made us homesick. What changes have taken place since we left! Bob Blake, Joe Bowman, Jim Gordon, Karl Hering, Fritz Krum, Frank Langhammer, and Ken Tsunoda were at the meeting. All are working in the New York area except Ken, who is located in Cambridge. Ernie Kaswell'39, who is at the Calco Chemical Company in Bound Brook, N.J., came over with us. We met Joe Casey '40 on the ferry coming over the Hudson. - Our Class is going to have a dinner at the New York club the first part of February. If you are in the vicinity, let us know.

John Nagle is still working out at the field house when he can get away from Camp Edwards. John took part in the maneuvers of the coast artillery in South Carolina. Speaking of artillery, none other than John Hermistone is a lieutenant stationed on the Technology campus. John still finds time to bowl a quick one during lunch time to prevent Eddie Pung from closing up. — Bill Hooper is helping to guard the Big Ditch. Gene Crawford is in Alameda, Calif.

From a chain letter from the 5:15 Club we got a great deal of information. Les Gott is at the Watervliet Arsenal, Watervliet, N.Y. He wrote: "My job includes writing 'specs' for the technique to be used in repair welding of gun parts, metallographic examination of failed parts, and work of a general metallurgical nature."

Dave Howard was married this summer before reporting to Fort Bragg, N.C.—Somebody at the Aberdeen Officers' Training Center told the general that Dave McNally was a good man to control the Maryland vice situation, so "there I was, assistant provost marshal. A month went by before the mistake was discovered, just long enough to earn for me the nickname of Lone Star. I saw Russ Werby recently."

Here are some addresses taken from the letter: Ed Hayes, Company A, 4th Battalion, Ordnance Training Center, Aberdeen, Md.; Dave Howard, 54th Ammunition Company, Fort Bragg, N.C.; Frank Storm, Office of the Chief of Ordnance,

Washington, D.C.

Pierre F. Hartshorne, Coast Artillery School, Fort Monroe, Va.; John Piotti (now '40), Office of the Zone Construction Quartermaster, Zone 6, Room 1773, 20 North Wacker Drive, Chicago; Russ Werby, Edgewood Arsenal, Md. Ed Sumner rooms with Dave McNally and Paul Koether'33 in Springfield, Mass.

Johnny Bone is employed by the Bethlehem Steel Company in Quincy, Mass. He wrote: "I spent the summer working in the tanks of what will be the world's fastest cruisers. I've now joined the structural design section." — Sam Solar, after a summer on the beach at

Lynn, is working in Boston for the J. E. Came Company, bowling and billiard equipment. It always seemed to be more than fun when Sam bowled. — Irving Berman spent six weeks at the engineers' R.O.T.C. camp, came back to Cambridge, completed his thesis, and then joined Uncle Sam's boys at Westover Field, Mass.

From the press clippings we learned that Jenny Matchett was married to Fred Spenceley. Fred is now associated with the Bell Aircraft Corporation, Buffalo, N.Y. Jeanne Gunther of Montclair, N.J., will be married in February to Miles Ross. Margaret J. Adams is engaged to Eugene March, and Jean Dower to Dave Foss.

Charlie Cole is now chief of the inspection section, raw material division of the United States Army, Springfield, Mass. Ken Spaulding is a metallurgist for the American Smelting and Refining Company, Perth Amboy, N.J. Norm Shapira is holding down the job as assistant to the post adjutant's office, Edgewood Arsenal, Md. He writes, "My work involves routine correspondence, guard roster, and so forth. In addition, I have been appointed assistant defense counsel for the special court — no cases yet, thank goodness."

A long letter came from Bud Blake down at Fort Knox, Ky., with the 16th Engineers Battalion. "I'm now back at Knox after three months in the field. Our maneuvers took us to Louisiana and the Carolinas. At Camp Polk, La., I came across Joe Myers. He had just come on active duty with the 23d Engineers Battalion, a component of the 3d Armored Divi-

sion. I've seen the following Tech men: Bill Taylor'40 and Manning Morrill'39, both in the 19th Ordnance; and Al Castle '40, in the 13th Quartermaster Battal-

What with the present all-out effort in war, it is possible that some of you men might — yes, it is possible — be drafted. An item which passed over our desk will prove of interest if you go in as a private. It is War Department Circular No. 245, November 26, 1941, and concerns officers' training camps and the requirements therefor. Look it up — or the changes thereto. It may prove of interest. — STANLEY BACKER, General Secretary, 46 Bicknell Street, Dorchester, Mass. WILLIAM R. AHRENDT, Assistant Secretary, The Graduate House, M.I.T., Cambridge, Mass



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